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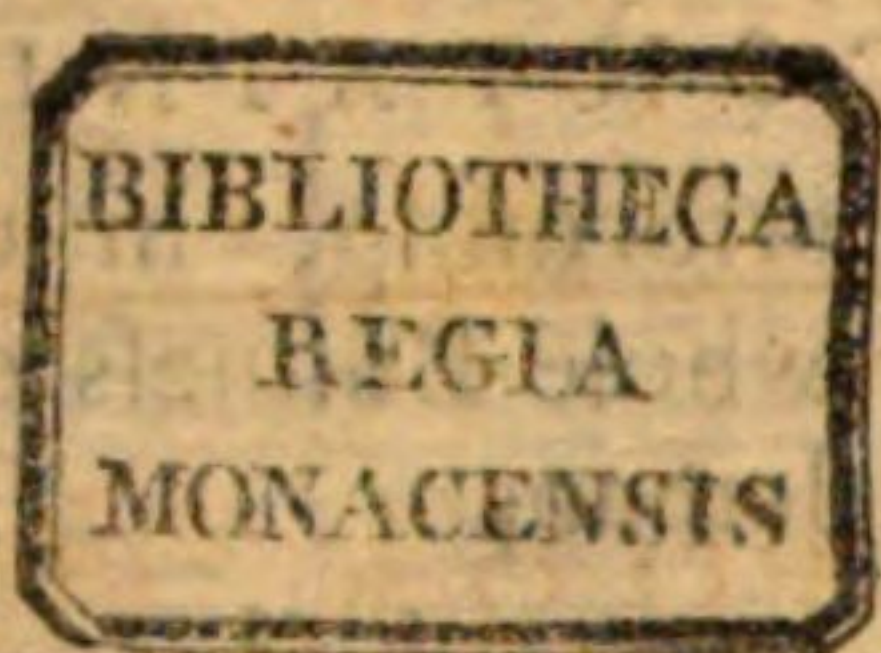
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A  
COMPLEAT BODY  
OF  
HUSBANDRY.

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BOOK VII.

*Of natural and artificial grasses. In TWO PARTS.*

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3. *Of grass grounds lying low.*
4. *Of accidents to which grass grounds are liable.*
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## INTRODUCTION.

**T**HE natural division of a farm is into pasture and tillage, the first concerns grass, and the other the various species of things sown after plowing. Though this be generally last named, it is by much the most important, wherefore we have begun with it; and having gone through the consideration of the soil, and of its management various ways for that purpose, with the methods of raising the best crops of the several usual kinds; we now come to the other part which concerns the grasses; and after this we shall deliver the culture of those roots which fall in this way, and of several crops of a less general sort.

Grasses are of two distinct kinds, tho' from their use blended together: these are the grass which naturally rises in the meadow and pasture; and those plants which are sown in fields, and from the purposes they serve, are called by the same name.

The first kind may be comprehended under one term, for its differences are not great; the other comprehends several, as clover, saintfoine, lucerne, and others.

The curious reckon two or three hundred species of common grass, but this the husbandman needs not regard. He will see some rank and some fine: he will distinguish the grass of the low meadow from that of the up-land pasture, and both from the short bite of the down; and this is all he needs to mind.

These several species taken together, make what we call common, or natural grass: the others are called artificial grasses, a term we shall use in compliance with custom, tho' not the most judicious that might have been chosen.

Natural grass is the produce of our own country, the growth of wild nature, and we have it finer than any other kingdom in the world: the others are principally of foreign origin; and most of them have but newly been brought into use with us.

Natural grass will rise of itself, the wind scattering its seeds every where: the artificial grasses are to be raised by culture; land is to be plowed for them as for crops of corn, and they are to be sown with as much care and regularity; and they answer the expence with a very large return.

We shall lay before the farmer the practice of the most ingenious and successful in different places; and add many remarks that have not been before made publick, relating to the culture of one or two particular kinds; for there is no part of the husbandman's profession that more needs to be explained.



## BOOK VII. PART I.

*Of natural grasses.*

## CHAP. I.

*Of the divisions of natural grass into meadow and pasture.*

**N**A T U R A L grass grounds are divided into two kinds, according to the place or growth; and the intended use, by the names of meadow and pasture; and generally understood by that distinction, the grass intended to be cut for hay, and that to be eaten on the ground. But this is an uncertain manner of speaking. By meadow some express the grass of low grounds only, that lie about rivers; and by pasture such as grows on higher lands; but both these are by the judicious farmer mowed at times, and fed at others; all that is properly to be understood by the two words is, that being used together, they express that part of the farmer's land which is not in tillage.

It is of importance to the farmer, to proportion the tillage and pasturage, one to another. There are many who call themselves farmers near London, and about other great towns, who deal altogether in pasturage; and this they may do without any necessity of tillage. But there is no such thing as a man's keeping his farm all in tillage, without pasture. His cattle must have food, and his fields for corn in the common way of husbandry, require a great deal of dung for manure.

This brings on the necessity of keeping up a proportion between one kind and the other, for which there is no laying down any general rule; because, according to the nature of his land, and the course of husbandry, more or less dung may be wanting.

Experience alone must shew this, but he will find it easy to make alterations where necessary: the laying down a piece of corn land for grass, and the taking up a piece of grass ground for tilth, being very easy.

There are particular estates that answer best in various manners. Some that are so rich and proper for corn, and that lie so conveniently for dung, that a much greater proportion than the common method may be kept conveniently and profitably in tillage; and others naturally favourable to grass, and that lie where there is a great demand for it: and in these the greater part should be kept for pasture.

As the distinction into meadow and pasture is very little settled in its meaning, we shall, to be the better understood by



all, speak in general of both under the name of grass ground. The hay from grass grounds that lie low, and are what is most properly called meadows, is generally in larger quantity than that from such as are higher; but this latter, though there is less of it, is sweeter.

The abundance of water that often gets into, or upon these low grounds, makes the grass rank: and where they lie in the way of constant wet, they produce a coarse kind. We see rushes in barren and wet places, and there are many kinds of grass, tho' not enough regarded, that more or less approach to the rush, which greatly diminish the value of the hay, that comes from the wetter sort of these grounds.

Grass grounds that lie high require assistances from manure, but those which are lower do not; the overflowing every river so far imitates that of the Nile, that it leaves a mud behind, which serves as manure, and makes the grass spring as fresh, as if art had been used to recruit the strength of the ground.

We have named two kinds of grass grounds, but there is a third yet to be mentioned, such as are within the reach of salt water, whether by the sides of rivers, near the sea, or by the sea itself. These are a great quantity in the kingdom, and are capable of being turned to very good account.

## CHAP. II.

### *Of grass grounds that lie high.*

**T**HESSE up-land grass grounds, some by way of distinction from the lower, call pastures, the other having the name of meadow. These up-land grass grounds differ in situation as they lie upon higher or lesser risings, or upon their tops or sides: they also vary in their soil, which, tho' it be in general different from that of meadows, is also various in kind between one up-land ground and other.

A certain degree of exposure is proper for grass, but there may be too much: therefore those risings which are of a moderate height, are better for grass than such as come under the denomination of high hills.

The next difference is, their lying on the top, or on the side of a hill; and this is so great, that it often trebles the value in one above the other: nothing is more frequent than for ground to be wet and boggy on the top of a hill, while it is perfectly fine on the sides.

Springs naturally rise on hills, and when they are pent in, they break and soak through the very substance of the ground, and convert the whole upper part of the surface into a bog.

On the contrary, the side of a rising ground that has a gradual



dual descent, is, of all situations, the best for grass. There generally is moisture at the bottom, which is very essential to grass; and there is a way for it to run off.

Grass will not thrive without water, nor can it be good where there is too much: this is the great article. Where the tops of hills have no spring, the bleakness of the exposure, and the poorness of the soil, render the grass weak: it is sweet, but there is little of it; and where there are springs, it is generally boggy. The way of getting off the water we have delivered in a preceding part of this work, where we treated of draining; we here speak of the natural condition.

The side of a hill having soil and moisture, feeds a rich and good grass, without having so much wet as to make it rank, or favour the growth of rushes, which generally depreciate that which grows on the tops of hills, or near rivers.

In meadows lying low, there is generally a black rich mould; and nothing more favours the growth of fine grass; but what these grounds gain in soil, they lose by the abundant moisture.

The up-land pastures have all that variety of soils we see in tilled ground; they are sometimes gravelly, sometimes loamy, or they are stony, chalky, or clayey. Of all these, the loamy soil, where there is good rich earth amongst it, yields the best grass; upon clay, it is apt to be coarse, because of the wet: upon chalk, it is low; upon gravel, it is sweet, but thin: the loam, when of the right condition, yields it just in the middle way between all these: it is plentiful yet sweet, and affords the finest hay, and the best food for cattle.

It may be often adviseable to break up a piece of grass ground on a clayey soil, because the clay may be improved by sand, while in tilth; but not while in pasture.

In Lincolnshire, their rising grounds have often a soil like that of their low meadows, a black rich earth; but, on examining, there is always too much wet at the bottom; their grass is, however, much finer than that of the low grounds. In many counties also I have observed, the tops of hills, in general, dry, and their sides moist: in this case the tops bear the sweetest grass.

A soil that is too clayey, is liable to great inconveniencies: in winter it detains wet, and in summer it cracks.

Black mould, such as is in the low grounds, yields abundance of fine grass when it lies dry on the side of a hill, but then it is commonly infested with worms: loamy soils are less subject to them.

A piece of slanting ground, with a loamy soil, and a moist  
B 3 bottom,



bottom, is the best for pasture; and if he can contrive to bring the water of some spring occasionally over it, nothing can add to the advantage: such a piece of grass ground will require manure at times, but it will answer the charge, by the quantity of hay, and richness of the grass afterwards, for it will always retain its natural sweetness. The poorer the soil the oftener it will require refreshment, but this is an expence returned with interest.

### CHAP. III.

#### *Of grass grounds that lie low.*

**T**HES E are meadows, fen, and marsh lands. All low ground is subject to overflowing, either in a larger way by rivers, or in a smaller by water from the higher grounds in winter rains. Both these wettings are of great benefit, if proper care be taken to carry off the redundant water; and to prevent overflowing at improper times.

The finest part of the mould is washed off by rains from plowed lands that lie high, and a part of the manure with it, and carried down with the water to the low grass grounds at their bottom, this renders them so fruitful. Land floods drowning meadows by river sides, have the same effect. The waters are thick and yellow, with the richest part of the soil from the adjoining high grounds, and they leave this upon those meadows. This renders the grass very plentiful, but as there generally remains too much of the moisture, it is coarse; there grow weeds in them, which are not in the sweet pasturage of the up-lands. There is a great difference in the value of those meadows which are liable to be overflowed by accident, and those which are only capable of being overflowed at pleasure.

Such meadows as lie flat on the banks of great rivers, are of the first kind; these are subject to accidental floodings, which may come at very wrong seasons; and they are therefore very uncertain as to the produce.

Those which lie near lesser streams, and little higher than the level of their waters, may be overflowed when it will do them good by turning the stream upon them; and these are worth much more than other low grass grounds for this reason; as the others, from their hazardous situation, are worth less.

To these two we may add a third kind of grass grounds, which are of a middle nature. These are such as lie above the level of the water considerably, yet not so much but that it may be brought over them by means of wheels or engines: this is expensive, but the benefit is very great. We have not the spirit of the Italians in this respect, nor indeed the necessity: they



they raise water to a surprizing height for the overflowing their pastures; and they owe all their verdure to that artificial management.

The meadows that lie on the sides of large rivers, have the same general soil, which is a rich dark mould: they yield abundance of grass; and they owe their fertility to the overflowings of those rivers.

When grass grounds lie near the borders of great rivers, but so high as not to be flooded accidentally, it will always be worth the farmer's while to have an engine for overflowing them as he shall think proper.

A great quantity of the grass ground in Lincolnshire, is what they call fen land. These are of the nature of those flat grounds, which lie near great rivers, and are subject to accidental overflowings, but they are of the worst kind, being liable to receive vast quantities of water, and often having also resources of their own beside. These we have spoken of in a former part of our work, treating of the manner of banking and draining them; as also of the third kind, which are the salt marshes: these are in themselves poor, and full of the worst sorts of weeds, but by draining and banking, they become excellent pastures.

#### CHAP. IV.

*Of the accidents to which grass grounds are liable.*

**W**E now come to consider those accidents to which grass grounds are liable, and which reduce their value. These are of three kinds, the first from weeds, the second from rubbish of any sort, left on the ground, and the third from ant-hills and mole-hills: these last are the most difficult to be removed, and when mowing is considered, they are the worst of all annoyances.

Weeds are hurtful in different degrees. All plants, not of the grass kind, may be called by this name, but some are beneficial: the white trefoil, which is a sort of clover; and the red trefoil, which is a wild clover, are both serviceable.

Large weeds are most troublesome, such as thistles, docks and mallows. These are to be drawn with the thistle hook.

Rubbish must always be picked off. Some will be thrown on by carelessness, and some comes among manure; which is perceived when the rains have washed in the rich part of the dung.

Women or boys may be sent in to gather up this, which consists of bones, bits of brick, and broken glass; a little trouble takes it off, and saves a great deal of difficulty to the mower.



## CHAP. V.

*Of ant-hills and mole-hills.*

**T**HE weeds being drawn, and rubbish picked off, the ground will be fit for the scythe, if there be not ants or moles about it; these raise hills that will greatly obstruct the business.

Some pretend, that in feeding grounds these hills are of service, but they err: there never was an ant-hill that did not occasion some mischief, and where there is one there will soon be more.

The loss is evident, because they cover a great deal of ground; and they bear but a poor quantity of grass. They not only increase in number, but in size, when let alone, and some have been cut up at last that would half fill a cart. They make the ground disagreeable to the eye, and unpleasing to cattle. The prudent husbandman will not follow the example of those, whose lazyness or ignorance suffer them to stand, but extirpate them at once: the sooner he sets about it the less is the expence; and though it be greater as these hills are more numerous or large, he should not be disheartened by that, but assure himself, that the advantage will always be many times greater than the charge.

There are several methods of destroying these hills, but when there is any quantity, the plow we shall recommend for that purpose, will do vastly the best.

Some order servants into grass grounds in spring, to cut up these hills by hand; and where there are not many, this may answer. A thin shovel is made for the purpose: with this the workman is first to cut through the ant-hill, beginning at its top, and pressing the shovel down with his foot: he is then to draw it out, and make another cross cut: this separates the turf and upper part of the hill into four quarters: these are to be thrown back, and then the earth underneath is to be dug up with the nest of the ants. This being done, the four quarters of the turf are to be thrown together again, and they will soon close and grow.

This was at one time practised universally; but the disadvantages are plain: here is a disagreeable hollow left in the ground; and some of the ants remain in the turf; and having so good an opportunity, will soon multiply: the hill will be as big as ever in a little time: for they are covered by the turf from the two accidents most pernicious to them, birds, and severe weather.

There is another consideration yet; which is, the body of the ants, with the earth taken out of the hole. How to dispose



pose of these is no little difficulty. The old custom was to break the clods to pieces, and spread it over the pasture. This was not destroying the ants, it was only dispersing them: there was nothing to prevent their getting together again, and accordingly they soon did so, and the field was over-run with them.

At present the farmers about London dig them out, and carry them off to their dunghills, where some are destroyed, but some remain alive to renew the mischief. These hills mix among the dung, and are carried with it again upon the ground, where the ants breed and multiply.

There cannot be too much care in extirpating these creatures. An excellent instrument is the ant-hill plow, its structure will be understood by any tolerable workman, and we need only caution the husbandman, that it be made strong in proportion to the service. The timber part must be elm or ash, and its two sides about five inches square; the iron must be thick, and well steeled; and it is to be drawn by two or more horses lengthwise.

This will cut through any depth of earth in the hills, and taking them off entire, they may be easily removed, and the surface left perfectly even.

When the edge of the iron wears, it must be repaired, and the implement always kept in order. For the few ants that are left in the ground, are exposed to all kinds of injuries, and are seldom known to be troublesome again; and the smooth naked surface being immediately sown with hay seed, becomes uniform with the rest of the ground.

The expence is little: a tolerable plow may be made for a couple of guineas, and a very good one, fit for any service, for half a guinea more. The price will be soon saved by the quantity of business done. As many hills may be cut down with this in a day, as would take ten or a dozen labourers a week.

The person who guides this plow, may make it cut deeper or shallower as he pleases, by raising or lowering the handles: and there is nothing it will not make its way through, with a good hand to guide, and a proper force to draw it.

The hills being cut up, there remains the disposing them so, that they shall not afford a return of the mischief. The common methods of spreading them on the ground, or carrying them to the dunghill, are wrong: but we shall shew the farmer how he may at the same time be sure thoroughly to be rid of the danger of their renewing the mischief, and at the same time make an advantage of them.

The bare space made by cutting up the hill, is to be sown  
immo



immediately; a person is always to follow the plow with a parcel of good hay seed in his pocket; and while he carefully sows this on the bare spot, others are to follow and take care of the substance of the hills.

These are to lay them in heaps, not very broad at the bottom, but high and hollow; and when they have stood a little to dry, they must be set on fire, and burnt to ashes.

Where there are but few of the hills, they may be easily piled up in corners, and burnt upon the spot, without damaging the ground; but where there are a great many, they must be carted off the spot, and burnt in some waste place: the nearer the better, for the convenience of carrying back the ashes. In both cases, the ashes must be spread carefully, and they will serve as an excellent manure.

Up-land pastures require now and then to be refreshed with some dressing, there is none better than these ashes; and 'tis in those pastures, where this is most wanted, the hills are most frequent.

A second way is to carry the hills all off the ground, and lay them together to rot perfectly. The ants will be thus prevented from a return, for the hills become moist throughout, so that there is no place for the ants to live among them, they must either leave the matter, or be smothered among it: one way or other the ground being cleared of them, and the manure also: there will be no danger from its going on again. This rotting of the turf takes time, and by that time it is ready for spreading, the whole race will be utterly destroyed.

A third way is to use the hills entire, as they are cut up, in compost. We have recommended a covered pit for dung.

Into this the whole hills may be thrown among the mud of ditches, fresh horse dung, and the drainings of the cow house and stables. All is kept so moist, and in such a state of fermentation, that it is impossible an ant can live, or any principle of life can remain in what are called the eggs: the addition in point of quantity, will be very great, and the whole may be used equally for the plowed land and grass ground, without the least danger.

A fourth way of using these ant-hills with safety, and to the advantage of the ground, is to make them into a kind of dry compost with lime, and other things: this is a safe method, and is more expeditious than the other: but different grounds require various manures; and he will therefore take whichever of these methods best suits the nature of his particular pasture.

The method of using it in form of the dry compost is this. When the hills are cut up by the plow, and carried out of the field,



field, they are to be thrown on a heap in some waste place; and a quantity of fresh and sharp lime is to be strewed pretty thick among them; and so managed, as to reach every part.

The best method is to spread a parcel of the ant-hills on the ground as thick as they can lie, without covering one another; and on these to strew a good quantity of lime: then to lay over this another coat of the ant-hills, and then another scattering of lime, and so on, till all the hills are piled up.

In this manner let the whole remain ten days or a fortnight: in that time the lime will have taken so good effect, that there will not be an ant found in the place. Then let a quantity of fresh dung be laid on the heap, and from time to time let it be well worked and turned as other dung is. This compost may be laid upon the ground from which the hills were taken; and the benefit, in a tolerable good up-land pasture, will last six years. This I have found by experience; nor do I know any manure so good, on a proper soil, for grass grounds. The bodies of the ants, which are very numerous in the hills, will, in this case, add a great deal to the efficacy; for all animal substances are full of rich matter for vegetation. This mixture of dung and lime with pond mud, is excellent for grass ground; but when the earth used for this purpose is impregnated with animal matter, the benefit is vastly greater.

When the farmer sees the practice in its full light, he will be able to count up the gains arising from a proper use of the instrument, and will find that in a course of six years growth of grass, the expence of the instrument, the labour, and every thing that can be brought into the account, will be above forty times returned to him: all the while he will have his pasture lie in a manner agreeable to his eye, and in a proper condition for the mowers, and for the cattle.

Among the accidents to which grass grounds are liable, the lodging of water upon them is the principal; but that we have treated of already, under the article of draining.

## CHAP. VI.

*Of clearing a pasture ground from stumps and bushes.*

THE way of drawing large weeds by their roots, has been laid down; but we are here to consider a greater annoyance, which is, the frequent growth of bushy stumps, and unprofitable shrubs. These are not uncommon in up-land pastures, and are suffered in the same manner as ant-hills, to remain upon the ground by the idleness of the farmer, till they reduce the pasture to half or a third part of its value.

I shall here speak of what I have lately seen practised, partly from



from my own advice, and partly by the spirit and resolution of the owner; by which about eighteen acres of up-land pasture, have in five years been rendered of four times their former value.

This was one of those up-land pieces, of which there are many in Buckinghamshire, where the grass is but little in quantity but very sweet; and the ground is over-run in patches with broom and furzes.

Walking with the owner, who kept this piece in his own hands, because nobody would give him any price for it worth naming, I proposed to him to undertake its improvement by two methods; the one was, getting up these shrubs, and the other, laying on a good deal of rich manure. Few would have had the spirit to venture so much as he did, upon so barren a piece of ground; but three years profit amply returned it to him, and now every farmer in the neighbourhood is desirous of renting the field. The method he took was this. He had an instrument made for tearing all the shrubs up by their roots; which, from its use, I shall call an eradicator. The invention is not mine, but as old as Gabriel Plat, who has mentioned it in his discovery of hidden treasures.

It is a large strong three-pronged fork, which, by the assistance of a block, as a leaver, is of sufficient force to tear up any thing. The bigness of it is so much more than a dung fork, that it seems improper to call it by such a name, wherefore I have given it another. The handle must be a beam of ash, fifteen or sixteen foot long, and its thickness such as will keep it firm against a great force. The tines should be twenty inches long, notched at the sides, and a little leaning upwards; and they must be joined to a strong shoulder of iron, with proper fastenings for the end of the pole. This being carefully fixed, the person that works it must fasten a rope of six or eight foot long to the end, and take with him a thick block of wood, and a heavy wooden beetle.

When he comes to the first shrub, he must force in the three points slanting into the ground, so that they go under the root, and the top of the pole shall be somewhat higher than his head; then with good strokes of the beetle, he must drive it well in, till the tines are quite in the ground: he is then to lay the block under the pole, near where the tines are, this will raise its top ten or twelve foot high; and he is then to lay hold of the rope, and pull with all his force.

Those who know the effect of the lever, will be sensible no root can keep its place against this: it will tear up the most firm; and in some kinds, will draw out fibres of seven foot in length.

When



When one is up, he is to proceed to the next, and so through the field ; throwing them on heaps as they come up, that they may be ready for carrying off the ground.

The field I speak of when we begun this work, was so full of tufts of shrubs, that there was not ten yards of it that could have been mowed, and it was very inconvenient feeding.

If we had employed men to grub them up with pick-axes, it would have cost at least twenty times the price ; and the ground would have been tore up in a sad manner ; and when we had done, so many of the broken roots would have remained, that there would have been presently a new parcel of shrubs upon the ground : whereas in this way, the expence was little, the price of the instrument is no great matter, and it will last for ever ; and the whole charge of working it was a couple of labourers wages for a few days. The ground was no where broken to signify ; the roots, in this manner of drawing, only cracking the turf, which fell together as soon as they were out ; and the biggest not so much as disturbing the ground for a foot space, and that mostly made up again by the falling of the surface together.

When the ground was cleared, we got together a large quantity of manure made of old well rotted dung, and the mud of the river ; among this we mixed the bottoms of a couple of old hay-stacks, a rich rotten earth, full of grass seeds. This being spread thick upon the ground, and washed in with the next rains, the effect was in a manner miraculous ; from a miserable barren place, it became the next spring very fine pasture, and is now a prime piece. The roots of the old grass shot freely, having no longer the woody fibres of the stumps to intangle with them, and hinder their progress ; and the seed grew ; so that here was abundance of nourishment, and a great number of plants to draw it.

This is to be done in any place in the same manner, and the advantage will be the same. Plat might very well call the secrets of husbandry a hidden treasure, for we see such of them as he exposed to view ; nay, such as the most common and popular writers copied from him, one after another, yet remain unknown or unheeded by the farmer, who might so greatly add to his profits by their use. This is an instrument no farmer ought to be without, who has any of this poor, and over-run pasture ground upon his hands ; and, by a proper use of it, I am convinced, that a great deal of what lies nearly as waste ground in this kingdom, might be made to bear a price. The best time for doing this is after harvest. The ground will then have winter to be quiet ; and, in spring, the shoot will be seen strong and fine.



## CHAP. VII.

*Of improving mossy pasture ground by burning.*

**T**HIS annoyance, though less conspicuous, is as pernicious in the effect as the other.

Moss is a sculking enemy to the farmer in his pasture grounds, but a very fatal one: the grass where this is predominant will appear low and thin, and the cause perhaps will scarce be seen: but on examining there will be found a carpet of yellowish moss spread over the surface of the ground, through which the few blades of grass have difficulty to make their way. The mischief encreases continually: for the moss sending out its side branches and young shoots, thickens more and more, and makes the growth of any thing else more difficult.

This is commonly the fault of ground that is too damp.

In the same kind of land, when a little wetter, we see tufts of rushes, or a low kind of rush grass; this grows in thick sods and covers a great part of the ground, nothing grows among it, and not much between it. The sods spread and encrease from time to time, till at length they will over-run the whole piece.

These, as they are faults of the same kind of ground, require the same kind of remedy. What grass there grows on these grounds is small in quantity, short, and poor. In dry pastures the grass is frequently short, but it is sweet; and where there is little of it, that is good; but here it is quite otherwise; what poor growth there is, is sour, and cattle neither like it nor thrive upon it.

The true remedy is burning the rubbish with some small parings of the surface, and sowing a better crop.

The turf is to be pared up in the same manner as we have described for burnbaiting, and to be set up on heaps, and when dry fired.

It will take fire readily, and will presently burn out. The ashes will be a rich manure, and the roots of the moss, and other mischievous matter will thus be perfectly destroyed.

The best time is the beginning of October. When the heaps are reduced to ashes, these are to be spread upon the bare surface and plowed in: the whole must be then sowed thick with hay seed. There will soon be a short green covering upon the surface; and this, as it makes no great shoot upwards during the winter, will be all that time strengthening itself at the root. It will get into tufts, and in spring it will shoot up, and be a fine pasture.

At the same time there should be drains cut through it in  
two



two or three places, to carry off the water that occasioned the dampness; and thus the owner will have a right to expect a new kind of produce, for he will have a sort of new land.

In the choice of the seed, care is to be taken it come from hay that has grown on land not altogether unlike this, in respect of moisture.

Botanists reckon up many kinds of grass: as some grass grounds are moist, and some dry, there are certain kinds that grow on the one, and certain other kinds on the other; the farmer is to suit his seed so far to his ground, for that of the grasses that delight most in wet ground will not succeed on such as is dry; and the seeds of grass from upland pastures will, in a great measure, miscarry in meadows. Therefore when hay seed is taken for the purpose of sowing this new recovered land, it must be got from such hay as has grown on meadows in low places. This will strike freely and spread properly, so that there will be no danger of a good crop of hay the very first year; and from that time the ground will continue encreasing till the third; after which, if no farther care were taken, it would decline; but the husbandman must take precautions accordingly.

The effect of burning the surface, which is very great for the time, and lasts some few years, afterwards leaves it worse than it was.

As the ground will grow weak after three years, care must be taken to renew it by proper manures before that time; and the best for this purpose are those which are most lasting in their effects.

If there be marle in the neighbourhood, a good quantity of that should be laid on at the end of two years, taking advantage of a dripping time in October. The finest part of the marle will so be washed into the ground at once; and the harder lumps will break with the frost, and then their substance will in spring wash in after the same manner.

Where there is no marle, pond mud is the best manure; but this never succeeds so well as when it is mix'd with rotten dung, and the bottoms of old hay stacks.

#### CHAP. VIII.

*Of improving grass ground by manures.*

**D**UNG is an universal manure for grass, and the more mellow and rotten it is, the better: most people content themselves with this, and seek no farther, but grass ground being of different soils, admits with advantage a diversity of manures.

For



For grass ground where the soil is a fat loam, the best manure is old dung and pond mud mixed together. The time of laying it on is according to the use the farmer makes of his land, from September to February.

The most favourable time is in the middle of winter, that there may be frost to dissolve the harder parts of the manure, and the rains may wash the whole into the ground, while there is no great power of sun to evaporate the virtue.

The way of laying it on is to drop it in small heaps at due distance; and employing labourers to break and spread it well by hand, to have it worked over afterwards with a bush harrow.

This harrow is to be lightly drawn over the ground, till the whole quantity of manure be torn to pieces, and spread; it will then be soon buried among the rising shoots of the grass.

Whatever other dressing we order to be laid on grass ground, this, so far as its nature allows, is the manner of spreading it.

When a piece of grass ground produces moss, but not in such a degree as to require cutting up and burning, the best method is to strew over it twice a year, namely, in October and in the beginning of February, a mixture of two part coal ashes, and one part wood ashes, wetted with emptying the pots of the family.

On a piece of grass ground that is cold, but not very wet, let the husbandman spread a good dressing of pigeon's dung; or of the dung of fowls mixed with earth and coal ashes. This is to be done at the latter end of February, and being the richest of all manures it must be spread with the greatest care: it will thus come to the roots of the grass, just as they are about to make their shoot, and will cause twenty blades in many places to grow for one.

There are good grass grounds on soils quite opposite to what we have been naming, that is, on such a loam as having a great proportion of sand, and little of the binding ingredients in it, is hot, loose, and crumbly. In this case the manure must be varied; nothing comes near the virtue of one of those clayey marles we have described under the head of manures; a dressing like this laid on early in winter, becomes quite broke and mouldered by the spring, and will all wash into the earth: the consequence is that it gives the two qualities that are wanting, firmness and fatness. The quantity of hay may be doubled by such a dressing, and the feeding in proportion; and although this be an expensive manure for grass lands in the first laying on, yet it well answers in the end; for the effect, instead



instead of three or four, (which is the common duration of manures,) will last ten or twelve years.

There is a hungry, cold, brown soil, not uncommon in pastures, consisting of poor loamy earth, and gravel. On this no manure answers like chalk: but then it must be a proper kind, otherwise there will be damage instead of an advantage.

There is chalk as hard as a stone, and there are other kinds almost as soft as butter. If the first should be used it would lie like so much rubbish on the surface, and cover one half of the ground without doing any good to the other: but if the soft kind be chosen, it breaks and dissolves with the weather, and washes in entirely. November is the proper season for laying on such a manure, and the frosts acting on it first, and afterwards the rains, it will all work in so perfectly, that by Lady Day there shall not be a lump as big as a nut any where seen upon the ground.

In some of the up-land pastures in Derbyshire and Staffordshire, there is a kind of brown earth full of fragments of stone. The proper manure for this is lime: we have shewn what a vast effect this takes in sweetening and fertilising land; and it has altogether the same in pasture as in plowed grounds.

When a grass ground is very sandy, the crop must be very thin, but the grass will be sweet: in this case a soft clay, with a small mixture of sand among it, serves as an excellent manure; for the sand will make it break and moulder, which clay alone would not, and thus it will wash into the ground. Thus it will give firmness and a body to the soil, and as to the small quantity of sand that gets in along with it, that is only added to the general mass, and can do no great harm.

These manures succeed on the various grass grounds; and these are the best times of laying them on. The expence of them should never deter us from their use, for that the very dearest always bring a manifold return.

#### C H A P. IX.

##### *Of the general management of grass ground.*

**T**HE two purposes to be answered by grass ground, are feeding cattle and the affording hay: the farmer is to consider their several benefits, that he may know where to borrow from one, for the advantage of the other, when he knows the profit will be answerable.

The first consideration is to be the time for feeding, and the time for laying up for hay. This varies in different parts of the kingdom. The situation and condition of the ground makes some difference also on this head natural and necessary;



and the circumstances of the farmer, with respect to feeding, must in some instances be allowed to break in upon what is known to be right.

Where they have plenty of manure, and make two crops of hay, the custom is to lay the ground for it about the middle of February. In this case a little more than three months gives it a growth for cutting; so that there is hay by the middle of May: in other places they are five weeks later in laying the grounds for hay: the latter end of March is a common time.

In the north of England they are as backward in their hay-making, as their corn harvest, and they lay their grass lands for hay accordingly. May Day is, in some places, not an uncommon time.

There is nothing so wrong as deferring the laying ground for hay so long: it may be convenient to him to feed upon it; but let him consider what will be the effect of a hot dry summer, and what will be the loss, if he be disappointed of his crop. Spring is the season for the grass to make its shoot; and if it be eaten over and over again at that time, and hot dry weather follow, it is deprived of the benefit of rains, and never makes the first shoot tolerably, nor comes to any reasonable growth afterwards, let the farmer suit his several occasions so, as to be sure of laying down his ground for the hay in time; and if he lose something in the advantage of feeding, he may be assured of making himself ten-fold returns for it, in this more profitable article. We shall begin the management of grass grounds with the preparation for laying them down, and from thence date the beginning of the farmer's care.

We will suppose him in the middle of March, to take off his cattle from the grounds where he has good expectation of hay, and to prepare for it by making all clean and even.

As soon as the cattle are off let him send in women or children to finish the clearing of the ground, by picking up the broken boughs of trees, and every other annoyance: this done let him send in a labourer or more, according to the compass, to break and spread all about, the dung that may have fallen from the cattle; and also to break and scatter any fresh mole-hills.

This being done, the expence of which is little, and the convenience and benefit very great, let him order the ground to be rolled.

The rolling grass grounds intended for mowing is of great consequence: it prepares the surface for the scythe, and destroys the last accidents that can happen to it during the preparation for hay.

In



In the winter months the surface of the ground will be rendered unequal, by the treading of cattle, in such places as the wet has most affected, and where it has lodged most: these make the growth of the grass so far irregular, and therefore are an injury.

During the first approach of spring the worms will be at work, and will, every damp and mild night, throw up abundance of their casts; these also are nuisances, though not great ones, and they hinder the right and regular growth of the grass: if there be moles, or if there be any ants left, they will also be at work at the same time. This is a season at which all should be set right; and the condition of the ground is such that it will easily be so. The roller will answer the purpose, for it will take more effect now than at any other time.

The winter's frosts will have mellowed all these broken parts of the ground, and the spring rains will have softened them, so that the roller will crush them. The rubbish of all kinds has been taken off, and all the old unevennesses taken down, so that there can be nothing in the way hard or different from the general surface. The roller will break all the little irregularities there are, and laying the surface perfectly even, will make way first for a regular growth of the grass, and next for the easy cutting of it.

The roller is to be of wood, but it must be made as true and even in its surface, as if cut out of stone, or cast in iron. The heavier it is the better; therefore it should be large. The trunk of a good sound thick elm makes the best roller; but the lower part must be cut away to a truth, and none of the bark should be left on.

We have shewn how to cut up his ant-hills. But this is a practice that will, in a great measure, prevent the expence and trouble. The spring is the principal time when these little vermin are at work; and if they be prevented then, they will, in a great measure, lie still till that time twelve month. The rolling with a roller of proper weight, destroys their new work, and kills a great many of them; after which the rest scatter so, that there seldom is any mischief.

There is a farther use in the rolling of grass ground: this is, the pressing down the earth about the roots, and by that means securing the young shoots, on which a great part of the hay depends.

Frosts are most fatal to plants, when the spring has been some time advanced: the heat of the weather making the succeeding cold of the nights more hurtful.



In the succeeding months, if there do not fall rain, the sun parches up the roots if the earth be left loose about them; but when it is thus pressed down, they are defended.

This has also another effect of great consequence, in preventing the lodging of the grass: that accident, which is as mischievous in a manner to grass as to corn, happens principally from the looseness of the earth about the roots. When the grass or the corn has some height, the wind will take effect upon it, and bear it down; but then if it be well supported at the bottom, it rises again as soon as the blast is over. The wind rarely breaks the stalk of corn, and more seldom that of grass; so that unless their support fails them at the root, they rise. When the earth is loose it gives way, and being pressed down, they remain down; but when it is firm about their bottom, no harm happens: rolling always gives it this firmness, and therefore prevents that accident.

When the roller is brought upon the ground, a careful person should be employed in managing it: it must be drawn equally, and slowly along. The first care is, that it go over every part of the ground; and the next that it be drawn leisurely, for otherwise it will not do half its business. Whoever will watch the passage of a garden roller, over a gravel walk when it is a little wet and rough, will see plainly this difference: the same roller, when drawn hastily over the walk, shall take very little effect; which, being brought over it carefully, and slowly, will make all level.

In this manner the roller is to be drawn over the pasture or grass ground intended for hay; and the farmer has then nothing more to do, but to see his fences are secure, and leave the growth to nature; the shoots will be numerous and firm, and there will grow a large, and every way excellent crop. In low grounds the cattle may be suffered to feed somewhat longer than in the up-lands, unless the season be very wet; so that it is some relief to the farmer. Though he should lay his higher grounds at the time we have directed, he will have, in a tolerable spring, a fortnight or three weeks; and, in a very dry one, a month more for his low grounds.

In these, as well as the others, when they are laid for hay, let him take care to have the ground levelled, and rubbish picked off; for, when the mowers come to work, all that charge will be very well returned. There will be none of those stops and stayings that there are, and always must be when there are hillocks, and other impediments in the way; and the mowers will be able not only to go on with their work regularly, but to come an inch closer to the ground; and this

is



is a very great concern. The farmers have a very just observation, that one inch of hay at the bottom is worth three at the top, and they have reason: nor is the aftermath at all the worse for this close cutting. That does not depend upon the stumps of the old grass that are left, but upon the new shoots made from the root; and the closer those are cut, the more free that shoot comes, so that the close mowing is every way an advantage.

## C H A P. X.

*Of mowing.*

**T**HE ground being carefully laid for hay, the farmer has no farther care but the knowing when to cut it. This he must carefully observe: for there is a proper time of ripeness; and all after, as well as all before that, is so much loss.

When ground is laid early, and has been properly assisted by manures, it will often be ready to cut in the latter end of May.

There are those, who, in a forward season, cut it earlier, taking the first appearance of ripeness, imagining they are securing their interest, by preparing early for a second crop; but they often lose more in the first, than it is possible they should get in the latter. The first crop of hay is the great article, and should be regarded accordingly: the other is always trifling in comparison.

There is a time of the year when every plant flowers; and grass, like others, has its season. In other plants, though their leaves stand pretty well during the flowering, they wither when they come to ripen the seed. The leaves of grass go to the quantity of hay as well as the stalks; and are indeed the best part; they are not therefore to be neglected for the sake of the other. The common kinds of grass, in well managed pastures, get into flower in the end of May, or beginning of June, this therefore is the natural and proper season for cutting of them. The hay will not have its due quantity till the stalks are full grown; but after that time, the leaves will fall so fast into a state of decay, that there will be more lost by twenty times at the bottom, than there is gained at the top. The price of hay is very considerable, but that depends upon its goodness; and this upon two articles, the time of cutting, and the manner of making; and upon the former little less than on the latter.

The faults in making are most obvious, but there may be poor hay got from a good piece of ground, either before, or



after the right season of mowing; while that which is truly excellent can be had only by seizing the right time.

The green colour of hay is valued. This is owing to the making; but it must be in the grass itself, otherwise all the care that can be taken in drying is in vain: a proper method of turning will preserve a colour, but it cannot give it: that must be from nature.

This colour depends on the time of mowing, or the degree of ripeness. When it is just in flower, the leaves are fresh, but when it is got to seed, they grow brown: this is the first step toward decay, and this change of colour no art can recover.

While the grass is coming to perfection, it is too green; when it has stood too long, it becomes pale; and that fine green so esteemed, can never be obtained by any art afterwards.

The smell is another article of value, and this must be preserved by care in making, but it must be owing to the time of cutting.

Hay that has stood long, has the appearance of stubble, and has no more smell; whereas at the time of flowering, there is one of the pleasantest flavours we know, from the cutting through of the stalk, and the evaporating of its juice in drying. The colour of the stalk fades as well as that of the leaves, after the season is over; and we shall see this plain enough, if toward autumn we look upon such grass as has run up among bushes, out of the reach of the scythe. The stalks of this were at one time in a condition to make fine hay, but we see them dry, brown sticks, without taste, smell, or any other quality.

The whole depends upon this principle, there is a state of perfection in all vegetables, and the art of the husbandman must be employed to observe, and his prudence to seize it. This state of perfection with respect to an entire plant, is just the time of its flowering. When we mean to save seeds of any thing, we must stay longer; and, in that case, we see the plant wither; but the time of its perfection is just the coming into flower. The apothecary buys his herbs for distilling at that period, knowing that just when the flowers are opening, the stalks, leaves, and every part are the fullest of virtue: and it is so in grass. The farmer must make the same choice.

Now we have given the reasons for chusing grass at such a period for mowing, we shall deliver the marks by which it is known to be so. Let the farmer examine the whole plant.

Thus let him go into his grass fields from time to time. Let him examine the stalks, and see how their tops approach toward ripeness; he will perceive the heads swell, and at length there



there will appear a few white threads. These, in some kinds only shew themselves on the surface; and, in others, hang down a fifth part of an inch. This is the flower of the grass, and when it appears, the hay time is near.

He must not judge from one or two plants, but see when the whole field thus gets into bloom; and then he must be critical in the examination. The fuller and fresher it is at the top, while the bottom remains sound and good, the better; therefore that is to be examined for the final marking of the time. Let the farmer open the grass with his hands in several places, down to the ground, and observe how the lower part looks: as these flowery parts ripen, the bottom will grow brown. This is the first mark of decay. After this the top will get nothing; and the bottom will lose a great deal, so this is the time for the mowing.

Mowers are to be sent in, and the ground having been prepared and levelled, they have no excuse if they do not cut it close. These are a sort of people who are very apt to slight over their work, and ready to seize upon any pretence for doing so: they have no consideration that their carelessness is the loss to the farmer, perhaps of a tenth part of his crop: but let him take care of it himself: as he has prepared the ground for them, let him follow them, and frequently put them in mind of it: they will thus be brought to do much better than when left to themselves; and the addition to the quantity of the hay will very well pay the farmer for his attendance.

We see farmers about London, riding in their grounds among their hay-makers, but this is an idle custom: let them walk after their mowers, and they will do themselves twenty times the service.

The business of hay-making is generally done better than that of mowing; and if any omission be made in it, 'tis easily seen, and there is time to rectify it; but in the mowing, the mischief is scarce to be seen, unless the scythe be followed; and when it is once done, there is no mending it.

The grass being down, is to be carefully dried. In this there is so much difference between the practice of the farmers in the parts of the kingdom where husbandry is most improved, and the others, that it should be set in the strongest light, to render those improvements universal.



## CHAP. XI.

*Of hay-making.*

**W**E have directed to cut down grass at a time when it has a full body, and a fine colour; and shall now shew the methods by which that may be preserved, and the neglects by which in many places it is lost.

In the less improved parts of the kingdom, the hay-making season comes very late. They allow little manure to the grounds, they lay them up late; and, consequently, in the most favourable summers they have but a poor crop of hay, compared with those who take better measures.

In these places the farmer never thinks of cutting his grass till it begins to look brown at the top, which indeed it does sooner than it would if better supplied with nourishment; and then it is failing at the bottom.

At that time he sends in the mowers, who cannot cut close because of the unevenness of the ground; nor does he insist upon it, for he imagines that the more they leave, the better will be his aftermath. The error of all this we have shewn, but we are sensible it is too common in a great part of the kingdom at present. When grass is thus cut, it has neither a good colour, nor smell; no art or management could make fine hay out of it; but if that could, it has not the chance; for the hay-making is as little understood as the mowing.

They let it lie in the swarth, and think they do enough if they turn it two or three times in the sun, never putting it into cocks, till they suppose it nearly made; they then put it up in large cocks, and let it stand a week or ten days to sweat; and then take it home, and put it up in a great rick.

Many have wondered at the difference between the hay about London, and that in remote parts of the kingdom: but none will be surprized who sees this reason. The whole management is bad there; and, in general, good here.

The great care is to preserve the colour. The grass being cut in the right condition, will be of a fine green, and the farmer may be assured, a loss of colour in hay is always attended with a loss of taste, and loss of smell; and a certain loss in the price.

To preserve the colour, and give it the full sweetness, it should be let to lie in the swarth two days and a half. Then it is to be spread out, this is properly what is called tedding of the hay; and thus it is to lie exposed to the sun during the remainder of the day. It is to be made up into little cocks, which are called grass cocks, at evening, and so left for the night.



night. The next morning, as soon as the dew is off the ground, these grass cocks are to be spread, and thus the side of the grass that had lain undermost, will be dried. In this condition it is to be all that day. Toward evening, it is to be cocked up again as before.

This is an excellent practice, for it at the same time gives the hay all the advantage of the air and sun during the day, and defends it from the dews of the night; which can do little harm when it is gathered up in these heaps. I have seen when this cocking up at evening has been omitted, the whole quantity which was very forward in drying the day before, has been damp and soft, and brought into a worse condition than at first; for the water of the dew is more hurtful to its colour than the natural juices of the grass. In this condition the smell and colour have been greatly impaired, and there has been no way of recovering them. This is not so bad as the practice of the remote farmers, whose hay is always brown, and mow-burnt; but it is much inferior to the true and careful method, and never fails to reduce the price.

In the proper method after tedding, and grass cocking, so far as we have named, the hay is to be spread again, and drawn up into a kind of lengths, which they call windrows. These windrows are easily thrown up into cocks, for they lie conveniently for that purpose: thus when the weather is fine, the hay has the full advantage of it, and if rain come on, the hay-makers can toss it into cocks in a few minutes, in which condition it will get little damage, and is ready to be spread again to take the advantage of the next fair blast.

From these windrows the hay is to be thrown into large cocks, and in these to stand through the night, and for some time afterwards: but it is not, though pretty well made, to be carried home directly from the field in this condition. The outside of one of these large cocks will be very dry, while there is moisture in the middle, and the farmer's business is to have his hay all alike; not only some of the juices of the grass will remain in that which has been in the innermost part of the cock, but it will sweat a little with lying together: therefore these cocks must be thrown to pieces, and the whole quantity of the hay once more spread upon the ground. If good weather follow, it will dry in a very compleat and perfect manner: three hours wind and sun going farther than a day at another time.

If the weather continue favourable, the hay-making is thus finished; but if rain come, he is not to turn the hay that has caught the wet as it lay spread, but to let it dry as it lies, which



which it will quickly do. On the contrary, if the over care of the hay-makers should turn the grass thus nearly dried, and then wetted by accident to the ground, the damp of the earth would injure it. As the wet is slight, and the sun and air have great power; the top will presently dry again by lying as it is.

After this spreading from the cocks, the hay may be thrown together for convenience of loading, and is in perfect good condition to carry in.

This is the true method of hay-making, but, in some cases, farther care may be necessary.

We have directed the farmers to get up all large weeds: but when this due care has been neglected, more time, and greater caution will be required in the making of the hay. When there are thick weeds among the grass, there must be more time to dry the whole than where it is clean, for these have more moisture: and if the hay be put up damp with them among it, they will give afterwards.

The more hands are employed in making hay, the better; and a careful eye must be kept over them, to see they do their duty.

## C H A P. XII.

*Of the aftermath, and the winter use of grass grounds.*

**T**HE hay of the first crop being carefully ricked, that trouble will be entirely off his hands. If the weather be favourable, his interest is to keep it till perfectly dry upon the ground; but if it be precarious, he may stack it sooner, observing the caution we have given to keep a hollow in the centre of the stack to prevent its heating.

The hay being out of hand, his care is to return to the ground.

In the more improved counties where the first crop comes early, they expect a second; and keep the ground as carefully for this as for the other.

The new growth is to make the second crop of hay: but, at the best, that is inferior to the former; and, upon the whole, the husbandman is often in the wrong to depend upon it.

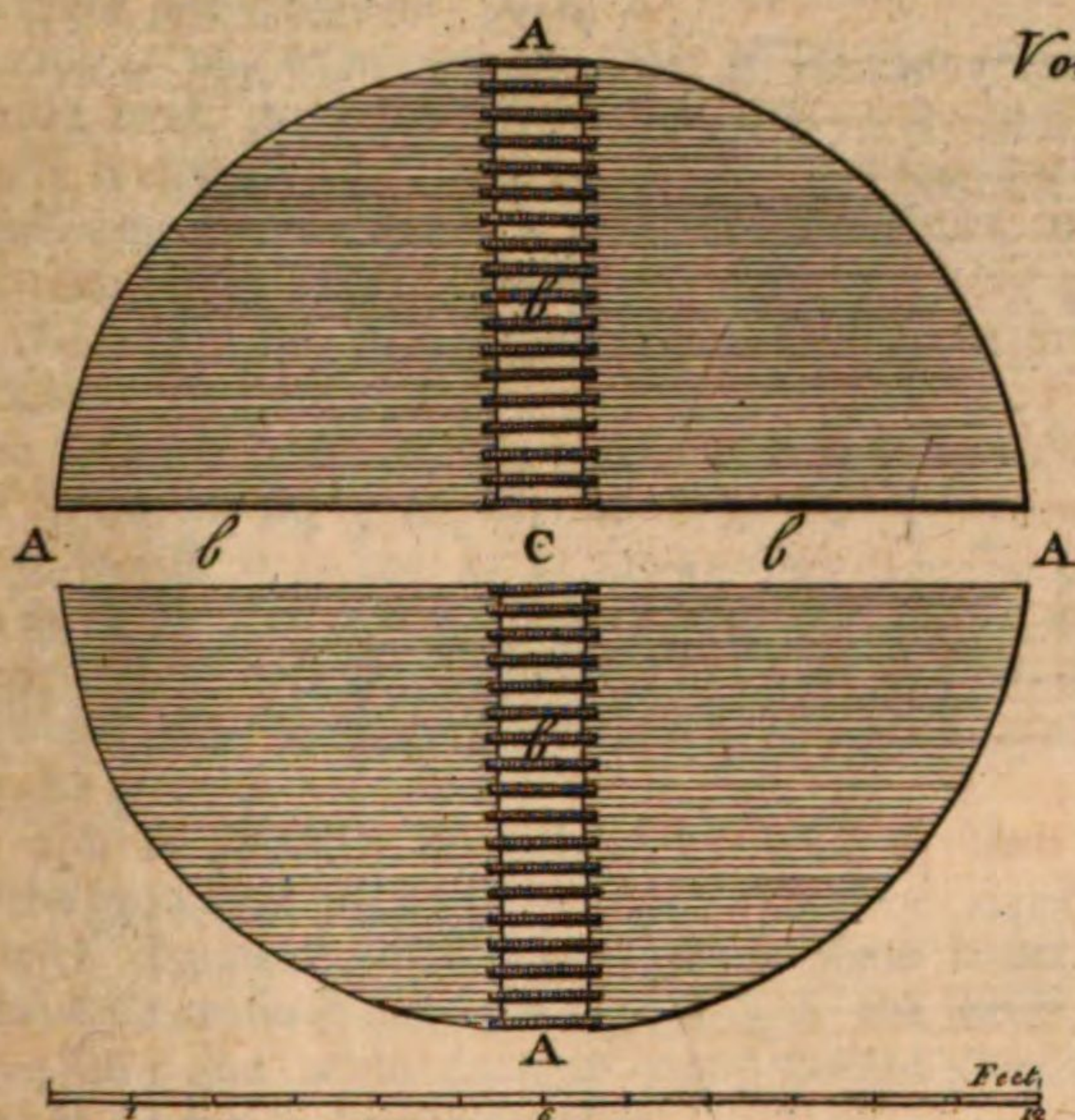
None but good ground, and what is kept very well in heart, will afford a second crop worth cutting; and even this not well, unless the weather favours. At the best the profit is but moderate, and the hazard is considerable; so that in many cases, it is better to use the ground for feeding.

Where manure is scarce, and where there is not all this exact care used about grass grounds, the farmer must not expect the advantages



PLAN of a FOUNDATION proposed for STACKING HAY upon;  
to prevent its Firing, tho put up with more Sap in it, or in a  
greener Condition than Ordinary: One Stone of such Hay having more  
Nourishment in it than two or three of the Common Sort.

Vol. III. p. 26.



AAAA The Circumference of the Foundation, laid with dry Stones or  
Brick & raised only one foot above the Surface of the Ground.

b.b.b.b. Four Cross Gutters, each one foot Square in the Bore, meeting in the middle  
of the Foundation, to be all covered over with loose pieces of Wood or Stone  
as one of them is in the Plan for Example.

C In the Center of Communication to all the four Gutters, place a Common Sack  
Upright with a round Bottom, Stuffed with Straw, & as the Cock raises, draw  
up the Sack a foot or two, till it be quite finished a top; then draw out the  
Sack, & leave its Track open a top as a Vent to the perpendicular Flue;  
till the danger of overheating be over, when it may be covered over & Thatched.

This greenish Hay begining to heat, soon rarifies & expands the Air  
contained in the perpendicular Flue, which is continually expelled a top, &  
succeeded by the Indraft of the cool dense Air from the Gutters below so long  
as the least heat remains in the Cock, which will prevent firing overheating  
& Mon-burning over much, especially if it be considered that no part of this  
Cock is distant above three foot from the ambient Air without or the Circu-  
lation thereof in the Center.

When the Cock is cured Thatched & quite cooled, the Gutters should all be Stopped  
on the Outsides with Wisps of Straw, or y<sup>e</sup> Hay will not keep so long & well as it  
might do, But if intended to be used in 3 or 4 Months after stacking, keep y<sup>e</sup> Gutters  
open the whole time, but the flue a top must always be closed in at Thatching time.

Complate Body of Husbandry.



THEORY OF THE EARTH  
AND THE HISTORY OF THE  
UNIVERSE



THEORY OF THE EARTH  
AND THE HISTORY OF THE  
UNIVERSE  
BY  
J. H. VAN DER KAMPE  
M.D.C.C.C.



advantages we name, to him who uses more art, and more expence in his improvements. It is not every ground in the most improved counties that will yield a second crop of hay to advantage, and in the less improved grounds, the husbandman is not to expect one crop every year.

The crop of hay from grass grounds, is like that of corn on the plowed land, the utmost the soil is able to produce; and it exhausts it accordingly. Therefore as in the counties where less improvement by manure is used, a fallow once in three years is allowed to recover the heart of the ground; in such places, the crop of hay should also be once in three years spared to give strength for the others.

There is some advantage in this, which may be called the year of fallow for the grass, in that it is not altogether useless: for, though it is not to be mown that year for hay, it may be eaten by the cattle. There will be the more upon it for them, because the heart is not suffered to run up to head for hay: and their dung as they feed will be enriching and improving the ground.

This will be perfectly understood by what we have before said of the growth of plants in general. The root supplies the leaves with abundant nourishment, while there is no stalk: when the stalk grows it demands a great deal, the leaves therefore have less; and when the seed comes toward ripening, all the care of nature is directed thither.

This shews the advantage of the year of fallow, as it may be called, to grass grounds, that is, the year in which they are fed, not mowed. The growth of the grass into stalk exhausts the root, and starves the leaves. This is suffered in the hay season, and it is therefore the hay crop exhausts the land.

When a piece of grass ground is kept a whole year for feeding, the stalks are eaten off as they would rise, and the leaves being also constantly cropped, new ones are continually sent up in their places; which being again eaten down before they are of a size to exhaust the roots much, the whole plant is kept in a condition of constant vigour, and the roots in strength and heart.

In this manner the year of fallow is to be conducted in those counties, where the want of improvement renders it necessary: with us the aftermath is to rise to a new crop for mowing, or to be eaten on the ground, according to the circumstances and occasions of the farmer.

In eating it off, the larger cattle are to be let on first, and sheep afterwards. These will eat where the oxen and cows can find nothing more; and when the ground is fed down in  
this



this manner, it must lie a few weeks to recover, and then the cattle are to be turned in again. This comprises the whole management of pasturage.

When pasture ground is overflow'd, let the young farmer follow the directions comprised in the following letter.

Jan. 15, 1756.

Mr. OSBORNE,

S I R,

I Have perused Mr. ———'s letter to you of this date. That learned and useful member of society, as well as great genius, does me much honour in declaring, my simple contrivance for stacking hay with safety, met with the favourable reception and good opinion of the publick; and that it has been of any service and credit to so important, and, as far as I am able hitherto to judge, so excellent a work as the present body of husbandry; every number of which I wait with impatience, and read with satisfaction, pleasing myself with a conscious view of ten thousand cornu copia's, and national benefits rising out of it.

If the remainder of this noble work be equally considered, and equally supported by science and practice, I shall not hesitate to pronounce it an honour to the British nation, as well as the undertakers; and doubt not but it will soon fly through the living languages of Europe.

I flatter myself the plan and description of my new invented granary, which I desired you to transmit to the gentlemen concerned, may merit their consideration: it cost me much thought and contrivance to make it strictly supportable by the laws of pneumatics, and to answer all its purposes with economy, and without the late ingenious invention of ventilators, to which the English and French have hitherto confined themselves.

That learned gentleman makes use of an argument that will always command my regard and best endeavours, the publick good; and he has with sincerity, my warmest desires to serve them, and oblige him in his request.

I shall first say, in the present case, that I apprehend no engine in nature can be properly and efficaciously applied, to the speedy draining of great surfaces of lands accidentally overflowed.

We must allow that wind, sun, falling of rivers, and imbibition of the earth are the productions of the great engineer: he leaves it to us to find or create levels, in this particular case, if we are impatient of his operations; and he expects we should, on such occasions, add the knowledge and skill with which he has blessed us.

I shall



I shall only observe, nothing can be attempted by us, whilst one uniform surface of water covers contiguous rivers, drains, ditches, and lands, as in many places it does at present; but the moment such rivers or drains have acquired a natural level, by the running off of some part of the inundation, the highest parts of those overflowed lands beginning to appear, the most adviseable instrument to apply is the Lincolnshire trenching plow, or, for want of it, a strong common two wheel plow; beginning near the river, or level's edge, and cutting up as far as conveniently may be, into the shallow verge of the stagnant inundation: assisting the cut occasionally with the spade.

This main cut, after the waters have wholly disappeared, should be enlarged in depth and breadth, and several smaller lateral cuts be made with the plow, where the gradual falling of the body of water indicates; by marking out daily the successive verges of all the ebbing pools or shallows, that approach nearest to the level of the main cut, and afterwards running the plow along such marked lines of direction, thereby opening the easiest communications between the several shallows and the main cut; employing the spade also in such lateral cuts where necessary.

This is the best time to discover the truest and most advantageous situation for such open drains, and to obviate an injurious duration of such future floods or inundations, water being the best and cheapest level for the industrious farmer when it happens so; and its retreat, especially in large pastures, should be carefully watched and staked out with small wooden pins.

The young farmer need only be told farther, that all sudden floods, of short duration, are greatly beneficial to grass lands, as they convey and deposit matter of great fertility upon the grounds they so visit. But these differ widely from the present grievous continued inundations. I heartily wish these hints may prove useful, and am, with compliments to — for the honour he does me,

S I R,

Your obliged humble servant,

JOHN STEVENSON.

BOOK



## B O O K VII. P A R T II.

*Of the cultivation of artificial grasses.*

## C H A P. XIII.

*Of artificial grasses in general.*

**T**HESE are principally of foreign origin, and all of them are to be sown and raised by culture.

The method of culture has been also copied from abroad, but we have greatly improved it. 'Tis the character of the English to receive and adopt the productions of other countries, and to make them our own by improvement. We have in no article done it more than in this of the foreign grasses.

There are many reasons to take a piece of ground out of corn, and sow it with grass. This used to be done in the old husbandry, with common grass seed, but at present the custom is by some of these, and the profit four, five, or more times greater.

There are great reasons for varying a crop from time to time. And these answer excellently for that purpose, giving the land an advantageous kind of fallow, while they afford a profitable produce.

The husbandman sees often the advantage of sowing corn or pulse, where grass would hardly grow, but this is raised at an expence of manure and tillage, and lasts no longer than one season: these grasses will grow, with proper management, on such ground as will not bear common grass; and they will also follow corn when it has quite exhausted the land.

Corn rooting slightly, can exhaust only the superficial part of the soil, so that these which go deeper find nourishment: and at the same time fallow and improve the upper part, which will be wanted for corn again.

The pulse kind are all improvers of land by this means; by shading the surface and mellowing it, while they draw but little nourishment: but these grasses do much better, they cover the surface more closely, so that there is more advantage to the ground, and they penetrate deep for their nourishment. They differ from pulse in this, that they require a great deal of food, but then they take it from such part of the ground as is not called upon for culture.

Every thing that enriches land acts upon one of these two principles, as manure or as fallow. The manure gives a fertility from themselves. The fallow leaves the ground open to receive



receive it from the air: but it will get it any where so it have rest.

In gardening, when much manure is not used, the ground is to be trenched once in two or three years, to make it fruitful. This trenching is changing that part on which plants stood, and from which they received nourishment. They dig to a depth sufficient to raise a new parcel of mould; and they bury the former surface in the hollow from whence they throw up that. In the same manner these grasses act, though under a different form, and every way more successfully. In that case the superficial earth is thrown under the new surface, where it gathers fresh strength, and will be fit to nourish crops again. In this method of the grasses, that under part, instead of being thrown up, is exhausted by plants, whose roots go down to it; and the upper part lies at rest, or with very little demand of nourishment from it. It is all the time sheltered by the spreading branches of the crop, and enriched by the dews and rains; and occasionally by the dung of cattle.

#### CHAP. XIV.

*Of clover, its most proper soils, and the manner of sowing.*

WHEN we spoke of the artificial grasses, as the product of other countries, we made a reserve in favour of clover, saying only, they were so in general. As to this in particular, it agrees in the manner of raising and cultivating with the rest; and we have the seed of some kinds from abroad; but it is in its origin a native of our own country. The common red trefoil, vulgarly called red honey suckle, is wild clover, and there is no other difference between that and what we raise by culture, but what the richer soil and addition of dressings has made.

Clover, and the artificial grasses, have not the least resemblance of grass, the use they serve in supplying the place of it, has occasioned their being called by the same name.

Clover is a low plant, and naturally leans on the ground. The roots are fibrous, some few small ones spread under the surface, but the greater part penetrate down. To draw up a root from common ground, one would suppose it did not go down above three inches; in a well manured field, where the earth is light and mellow, the longest fibres carefully drawn, will measure about six inches; but they may be traced with care to fifteen or eighteen; and do really penetrate much farther; but that they are then very fine, and scarce to be distinguished.

The stalks are numerous, jointed, and spreading. The leaves



leaves grow from the stalk, and many from the root. Each foot stalk has three upon it, and they are often spotted in the middle. The flowers are red, and stand in little tufts at the tops of the branches. They are of the shape of the pea blossom, but small, narrower, longer, and not so open; and the seeds are contained in a kind of little pods. There is a drop of a honey-like juice at the bottom of each flower, whence it obtained the vulgar name of honey-suckle.

Clover differs according to the degree of culture in bigness, and the form of spreading or standing more erect. The wild honey-suckle, which is common among the grass of pastures, is an advantage to it. This is low, and in a great measure lies down upon the ground: in fields where it is raised from seed got from cultivated plants, it is larger and more erect. The leaves are larger, and so are the heads of flowers. We have also what we call the iron clover, which is very sweet and smaller than this, but it differs no otherwise than from the same kind of accidents. The Dutch and Flemish taught us the use of clover, and they raise it to a great advantage at this time, the quantities they sometimes obtain from an acre being too great for the credit of those who have not seen their great care and excellent management.

With respect to the soils the richest always succeeds best with clover, and there is none so good but it may be worth while to raise this grass upon it. There is land too rich for corn, for it will make it too rank, but this will excellently nourish clover; and on the other hand, it is a bad and ignorant practice to sow this on poor ground, for it will never come to good. Whatever would be needful to suit such land to corn, the same will be necessary to make it bring clover to good.

We mean to shew what is necessary for clover, but we shall inform the farmer, that in the common course of things it is not to be sown on rich land new broke up; or on such as has been dressed and prepared purposely; but is to follow corn, and will then serve in the double capacity of yielding a rich crop, and preparing the land for corn again.

The best soil for clover is a light, warm, and rich earth. Such as is principally what we call mellow earth, but with a portion of somewhat loamy, for otherwise pure mellow earth alone is apt to lie too heavy for clover.

A rich loam is an excellent natural soil for it.

The land designed for clover must be brought into good tillage, and for this reason it very well follows corn, as it then comes upon a land which has been well wrought, and with respect to the nourishment this plant requires, is not exhausted.

If



If the farmer should chuse to break up a piece of ground on purpose for clover, the freshness of it will make that growth succeed, though in its nature it should be improper. As to other soils different from those we have named, if the farmer finds it convenient to use clover upon them, he must manure them accordingly. Marle, dung, lime, or the like, which are used to prepare land for corn, are also proper in this case for clover.

The common custom of sowing it with corn is liable to objections, but they may be got over by a proper management; and then this will be found a profitable method.

Nothing is more common than sowing clover with barley, in which case it is apt sometimes to over-power the barley in its first growth, and will do great damage. In a wet summer the clover will grow at a great rate, and the injury of the barley will be very great this way: on the other hand, in a very dry summer it is too apt to fail.

To prevent the damage of the barley by the growth of the clover; the best way is, though they are sown on the same ground, not to sow them at the same time. Let him sow barley alone in the usual manner, and wait till it is three inches high above the ground: then let him sow his clover by means of a hand drill. This will answer the purpose extreamly well. The clover will do better than when the seed is scattered at random; and not the least damage will be done the barley, by drawing the drill through the field, the person entrusted with the work being tolerably careful.

In this way the barley will have got so much head before the clover shoots, that it will be too strong to be over-powered by it; and at the same time, if the season prove dry, it will be high enough to defend the clover.

We have said clover may be sown alone, but when it is judged more proper to sow it with another crop, barley is not the only kind: it may very well be sown with oats.

When a crop of any corn is to have clover among it, less seed should be used than if it were to grow alone: and as to the manner of sowing it, if that be done by hand with the corn, there should be chosen a fine mild day for the purpose; because the seed is so light that otherwise it would be blown about, and left on the ground in an irregular manner. The best way by far is the drilling it in afterwards.

The time of sowing must depend upon that of the corn with which it is to grow. The little time after is very well worth waiting, for though it keep the clover back, it brings the corn forward. If the farmer be desirous of having a crop of clover



early in the ground, though sown with corn, the best method is to sow it with black oats, and get them in as early as possible.

The spring corns are not the only kinds among which clover may be sown. It will thrive very well with wheat and winter rye, if sown with them in the beginning of October. There are advantages attending this method, that are to be had by no other. A dry summer hurts a crop of young clover extremely. There is no plant that more requires rain in the time of its first shooting. It is for this reason when sown very early with black oats it always thrives, because it has the advantage of the rains of spring. When it is sown in the beginning of winter, with wheat or rye, it fares still better, for it is sure to have a long time of wet, before there will be any sun or drought to hurt it. In this case also it strengthens itself in the ground extremely, and is always found thick and flourishing on the reaping of the corn.

Some might fancy that a thick crop of clover growing among wheat, would impoverish that grain, because of the great quantity of nourishment it requires; but they do not interfere with one another, the wheat rooting superficially, and the clover more deep.

When clover is sown alone October is the best time, though spring be commonly chosen. Very severe weather may hurt it, as it will almost any thing; but clover being a native of our country, is not a very tender plant: if the winter be tolerably mild it will make vigorous shoots, and strengthen itself in such a manner in the ground, as to yield an early and very plentiful crop in the succeeding summer; after which it will continue firm in the ground, and encreasing in value. There is this particular advantage in sowing clover in October, that it comes up free from weeds, whereas in spring they rise in abundance among it, and many of them being of quicker growth will over-power it.

Some, when they are about to lay down a piece of corn land for grass, chuse to sow it with ray grass and clover mix'd: but the best method is to sow them at different times, though they are to grow together afterwards: the best corn for sowing with ray grass and clover is wheat, and the best way of doing it is thus. The wheat being sown at its natural time, let the seed of the ray grass be sown with it and the clover the following spring. This must be done early, that the clover may, during its first growth, have the advantage of the spring rains, and be got to an height in summer.

There is, in the common way of husbandry, another reason



son for sowing it very early in the spring in this case, which is, that nothing more can be done as to the covering it at that season, but rolling the field: now rolling, while the corn is very young, will help it; but if it should be done when it has got into stalk, it will hurt that crop extreamly by breaking the stems, which difficultly recover such an injury, after they have arrived at any strength. This we have explained at large in a preceding part, under the article of rolling.

When the farmer thus sows two grasses with wheat, he is to let in the last in the same manner as with the barley, if he will follow the most reasonable practice. Let him sow ray grass with the wheat in October; but when he comes in spring to sow his clover, let it not be done by hand, but by the hand drill, and sow the clover we have directed when it is to grow with barley.

The damage the severest winter can do clover, is not so great as that of a dry summer to such as has been sown late in spring. If the roots be tolerably covered, and the soil lie any thing close about them, they will get no harm. When the farmer finds danger of the winter, with respect to a young crop of clover that is alone, his best method is to turn in his sheep to eat it before the severe season. The leaves and stalks which would have been destroyed by the frosts, will have answered their purpose; and the root being better secured than before, by the trampling of the cattle, which fixes the ground about it, will stand perfectly well: having no head to support during the winter, it will send up its leaves and stalks vigorously in spring.

The husbandman is to consider next the nature and quality of the seed; to chuse such as is new, and of a good kind. Among the several quantities of clover seed offered to sale, there is a great deal of variety of colour; some is yellowish, some redish, and some blackish. The yellowish is the best, and to have the true tint, this should be a greenish yellow; the redish is the next good colour, that which is black is worst.

It should be clean, large, and glossy on the surface, which is always a proof of its goodness, as a dusty heavy aspect shews it has been damp, or has had insects in it. The next consideration is the quantity; about this there is much dispute, some say six pound is enough for an acre, others use twelve or fourteen.

The general practice is wrong in allowing too much seed; but those who use this smallest quantity err on the other side: six pounds is too little. Clover never grows to any considerable size; it is but small in comparison of other of the artificial



grasses, therefore the plants are not to be kept at that distance which the others may be with advantage. Eight pounds of good seed is as little as should be allowed to an acre in any condition; and those who go beyond ten, allow what is superfluous. Nine pound may be called a good quantity: the largest quantities yield not only the smallest, but the worst crops.

Many of those who have written on this subject say, that a very large quantity of seed will yield him so much the larger crop. This has been the general error.

#### C H A P. XV.

##### *Of the feeding cattle on fresh clover.*

**T**HERE are two uses for which clover is sown; the feeding cattle upon it as it grows; and the laying it up for mowing, for hay: in this it resembles the natural grass, and answers both these purposes in the same beneficial manner. But there must be care in the feeding it on the ground.

The richest foods on our own tables are capable of doing us the most harm. They will often breed distempers in us, and cattle are no more exempt from these than we are.

Clover is a very rich food for them, and they are so fond of it, as to eat of it often immoderately; wherefore unless care be taken, especially when the clover is rich, and they are suddenly turned into it, they will get disorders. An acre of clover will, on a moderate computation, feed as many cattle as six acres of the common run of pasture grounds: but, in order to make the most of it, they should not be turned into the field to trample it down at random: it should be mowed fresh as it is wanted, and given them green in racks.

Cattle being turned at random into fresh clover, will eat of it till they burst. It is best to feed them with it fresh mown, in proper quantities first, that they may be used to it, before they are turned in to take their fill. The novelty of the taste recommends it, and they are like children in the shop of a grocer, whose only danger is till they are used to the sweet things; after which they will not eat to hurt themselves.

Some consideration must be had as to the state of the cattle: for some will bear a rich nourishment better than others. As for such as seem most likely to receive mischief, the best way is to give them straw with it at first.

When they are first turned into the field of clover, it should be done gradually.

The right method is first to turn them in about the middle of a hot day, when they have eat before, and the leaves of the clover are a little flagged. The great danger of this food is,



is, when eaten in too great quantities, and when the dew is upon it; therefore care being taken as to the dryness of the clover, the next article is the not suffering them to eat too much. They should be suffered to be in the clover but half an hour the first day; the next day they should be turned in at the same time, and left an hour, and so on till they are accustomed to it: this we have observed generally before, speaking of the horse and its food: but it is proper to be more particular here.

Some regard is to be had to the weather; for experience shews, clover is apt to damage horses in wet seasons, and much less so in dry.

It is for the good of the clover, as well as of the cattle, to keep them off in wet weather: their feet are apt to do a great deal of harm at any time, but they will do most when the ground is damp.

The addition of ray grass to clover is advantageous in all respects, and in none more than this of health to the cattle that feed upon it. Ray grass is more of the nature of the common and natural grass of our pastures, which is their proper food; therefore being mixed with the other, it tends to correct its richness; and, in some degree, answers the purpose of straw, which we have said is proper to be mixed with it. At the same time that it renders it more wholesome, it increases the crop in quantity, for this spreads under the surface at the root; whereas the clover penetrates down deep, so that they grow as well together as the corn and the clover; and the quantity is vastly increased upon the ground; for the leaves grow together as naturally and as well as the roots, standing no more in one another's way than they do. The clover spreads in an open loose manner, and its branches shelter the ground where the roots of the ray grass stand, so that it is moist and full of nourishment: in the mean time, the narrow slender leaves of the ray grass rise up and appear through the clover, without any difficulty. Both grow together; and are fit to be mowed together for drying, or to eat together on the ground: but there is this caution to be given the farmer, that clover and ray grass do not prepare the land for corn any thing nearly so well as clover alone. A crop of clover improves the ground, by sheltering the superficial part, and drawing its nourishment from some depth; but ray grass roots shallow as corn does, and therefore the ground is, in some degree, exhausted where the corn is to get its nourishment.

We do not speak this so absolutely as if ray grass was never to be mixed with clover, where corn is to come afterwards



wards. The farmer will know by this, that, in general, clover alone is proper to be sown where the land is soon to bear corn again; but, on the contrary, when it is intended to lie longer in grass, then clover and ray grass together. When ray grass is mixed with clover, where corn is to follow soon, the quantity of the ray grass must be small; whereas when the ground is to lie long in grass, the quantity of the ray should be large.

Cows are subject to disorders from clover; and when it does not take this effect, it injures their milk in flavour, and is prejudicial to the dairy. This is greatly abated by mixing ray grass in sowing, for this being nearer the natural provender of the cow, takes less effect upon her than with the other. The common grass of our pastures has frequently the wild clover among it; so that there is no other difference between a field of clover and ray grass, and one of our common pastures, where there is a large share of honey-suckle trefoil; but that the one is a mixture of grass and clover, in which the grass has the larger proportion; and the other is a mixture of the same things, in which the clover has the largest part.

Clover, though it is a much more lasting crop than any of the pulse kind, which are sown for the same purpose of improving the ground, yet is but of a certain duration, and that not equal to saintfoine, or some other of the artificial grasses. Clover will last well enough three years; but after that it declines so greatly, that it is not worth continuing upon the ground. Therefore the farmer at the end of three years, must, in the common course of his practice, plow up the land again: if he design it for a different crop, he will find it very well improved; if he intend to continue the clover longer upon it, he must sow a fresh parcel after good plowing, as he did the first, and it will stand three years more in the same manner.

The common practice requires this; but it does not follow, that the thing is in itself absolutely necessary. For it might be much otherwise in another manner of managing the crop.

On certain occasions, common grass requires its year of rest; and, if clover on the third year were not to be mowed, but only eaten, it is probable it would recover itself so as to last longer. It is an experiment worthy to be made.

The Dutch were the inventors of cutting clover green, and giving it to cattle in the racks: beside its not subjecting them to disorders, there is a great deal of frugality in this management.

Where clover was given in this way to larger cattle, it was dis-



discovered hogs are fond of it: this led to the trying them with clover; and it has been found an excellent food. Some have proposed extravagant profits from this; but without trusting to such calculations there may be great advantage in it.

Feeding cows on clover would be more regarded, were it not found to give a taste to the milk. The farmer when he sees an inconvenience, is not to suppose it can never be remedied. The cure is easy, it is only the not letting them feed entirely upon the clover. The natural food of the cow is common grass; the clover should not be given alone. When the ray grass is mixed with clover it is more proper for cows, but the best method is to feed them in clover during the day, and turn them into a common pasture at night: the milk is thus rendered abundant by the clover, and is kept to its common taste by the other grass.

When hogs are turned loose into a clover field, they destroy and taint it with their dung and urine, after which they will not eat it freely. This is so great a disadvantage, that I have seen where hogs have throve extreamly upon it for a time, they have afterwards pined away. It is not that the clover does not agree with them, but that they have spoiled it, and don't like it any longer in that condition. Feeding them with it properly, it would be an excellent improvement upon the common methods in that respect.

Sheep are also fed advantageously with clover: they will eat it fresh, or in hay; and it is of vast service in the breeding up of house lambs. The ewes feed on it in summer in the field, and in winter on the hay under cover; and there is no food that supplies them with such plenty of milk.

The farmer will find this a vast article in feeding of his horses in summer and winter; the grass and hay being equally proper, under a right management. Sheep, and grass lambs will also very well fatten upon it; and the store sheep may be supported on it during summer.

Some have sowed clover with pease, and others with horse beans. The pease are apt to spoil the clover; but there are occasions in which it is proper. The beans, as they do not lie upon the ground, are not liable to the same objection; but the preparation of the land for beans being less than for pease, and the clover requiring a very well tilled ground; this does not succeed so well. When the change of crops renders it necessary, these things may be done; and some time may be saved by a crop of clover, in which the ground otherwise would be idle; but these are accidental considerations. The proper and profitable methods are those we have directed in speaking



of that article; either with clover alone, with ray grass in the common method, with barley or oats, or with wheat.

### CHAP. XVI.

#### *Of the mowing of clover, and its hay.*

**T**HE growth of clover is so strong, that it may, where circumstances suit, be mowed more than once in the year.

The first time is toward the end of May. The root has been well strengthened in the ground; and the shoots are numerous and strong. The farmer is to look well upon it for the proper season, for it is not in the nature of these things to allot any certain day of the month. It is a particular condition of the plant that gives the rule for mowing, and this may happen according to the soil, season, and other accidents forwarder one year, and backwarder another; and earlier in one crop, and later in another the same year.

The latter end of May is the usual time of clovers first coming fit for cutting, but it may be sooner. He should begin to look upon it in the middle of May; and observe in what condition it is with respect of flowering. The time when clover is fittest to be cut for hay, is just when it is getting into flower, the leaves and stalks of all plants are then fullest of virtue.

The flowers of clover grow in small tufts, or roundish heads, at the tops of the branches, in form of green, hairy buttons, some time before the flowers begin to open. The farmer is to watch the appearance of these, and to observe how they gradually come toward ripeness; and he is to send in his mowers just before they begin generally to blow. A few will make a shew here and there in the field, while the rest are exactly in their right condition; for there is no plant, a whole field of which gets into flower all together. This is his time, when all the plants are full of heads, and some few of them only have begun to open into flowers. Several have erred in letting the clover stand too long for the first mowing; and they think still in many places, they ought to see it in full flower all over the field before they begin.

The intent of the farmer is, first, to get a crop of rich hay, and next to have his clover roots in a strong and vigorous condition; for their shooting quickly afterwards, is a thing of great consequence.

The time when his hay will be best, is when it is thus just getting into flower, and this is a time at which it has not exhausted the roots. If it be cut just at that period, the roots having lost the large head they had to support, will push out  
their



their shoots with a surprizing strength; but if the plant have been suffered to stand till all of it be in full flower, and some getting into seed, which happens very soon afterwards; the store of nourishment that has been called up, has, in a great degree, exhausted the roots, and they will grow poorly afterwards for some time.

Therefore as soon as all the plants are knotted, or have the heads formed at the end of their branches, let the crop be cut; and let the mowers have caution to cut it as even as possible; for this greatly forwards the growth of the new shoots. When cut, it is to be managed exactly as common grass, and so made into a dry, firm, and sound hay. The farmers must not be surprized at clovers shrinking in the drying, for that it always does in a very particular manner, its branches falling together, and the whole getting into a very small compass.

Care is to be taken thoroughly to dry this, because having a great deal of natural moisture, it will otherwise be ready to become damp afterwards, and by that means to decay. Being cut at this proper growth, and carefully managed in the making, it will be an extreamly rich and wholesome food for the fattening all kinds of cattle. When it has stood too long upon the ground before cutting, the hay is too rank, and has not the excellent qualities of this first crop when made in perfection.

After mowing this crop the land is to rest, and occasionally it may be mowed again once, toward the end of summer, or twice: the former time in July, and the other toward autumn. There may be reason for cutting three crops of clover; for different farms are circumstanced variously; but to speak in general, it is not what the husbandman ought to make the rule of his practice. Very often when three crops are cut, there is not weather for making the last tolerably, for the clover requires good weather, more than common grass, because of its juicy nature. When the season favours, the second crop impoverishes the third, and seldom gives it time to ripen.

In the common run of things the advice that is most profitably to be followed, is to make but two crops of clover hay; and this is very material, when one of them is intended for getting of seed, which is very proper: in this case there requires a time for the last crop to ripen thoroughly, which it will rarely do when two have been cut before.

We shall suppose the last crop of clover in the summer, to be intended for seed; and in this case it must stand a good while. The owner must look in upon it from time to time; and watch the season of its seed being ripe. He must wait this  
with



with patience; and he may wait without fear, for this is not one of those crops, the seeds of which are apt to shed.

If clover have been well managed, the seeds will begin to appear in the husks toward the end of August, sooner or later, according to the soil, season, and manner of sowing: from this time it will take between three weeks and a month to be thoroughly ripe: and when it is in that condition the stalk will begin to grow brown. This is the case in all plants, and this is the time for mowing it. When the stalks are brown or yellow, and on opening the husks the seed is found to be yellowish, the full time of cutting it is come, then the farmer is to take the advantage of a good dry day, and get it down. It is then to be made with care into hay, but this does not require all that length of time that a crop does when the stalks and leaves are fuller of juice. When dried it is to be laid up, and to be kept in the straw in spring.

Toward the latter end of March it is to be thrashed and separated from the straw. After this the husky part is to be well dried in the sun, and thrashed again; after this second thrashing it should be spread for a farther drying, and then worked about with rakes, and rubbed thoroughly in the hands, and by this means a great deal more seed may be got out of it.

By the difficulty that the farmer will find in getting the seed of clover clean, he will learn not to be afraid of letting it stand in the field till thoroughly ripe, for otherwise it will never separate tolerably; and he may be sure there is no great fear of waste, in a seed that is thus unwilling to leave the husk at any rate.

Two bushels of good seed will generally be had from an acre: but it is the nicest affair in all thrashing, so that the farmer must see to get a person who understands it: such a one will do four times the business of another.

The difficulty of getting the clover seed clean from the chaff, has induced some to prefer sowing it in the husk, and there is no great danger of its succeeding, provided it can be distributed properly on the ground; but as the wind is apt to have too much power upon clover seed, in the common way of sowing it, when it is clean, it must have more this way, and there will be danger of its blowing into heaps in some places, and leaving others vacant.

This objection is only of force against the common way of sowing: where that is done by the hand drill, as we have advised in the sowing clover with barley, it may as well be used husk and all, for it may be laid in with the same regularity as if naked.



The seed of clover of the first year is better than any other, but it will grow very well the second : after this it is hazardous trusting it, a great deal of the seed miscarrying.

CHAP. XVII.

*Of the soil for saintfoin, and its growth.*

**T**WO articles give saintfoin the preference over clover ; its larger size and its longer continuance in the ground. Clover lasts properly but three years, saintfoin will last four times as long ; or more than that if necessary. In order to keep clover a little longer upon the ground without fresh sowing, the second crop must be given up as to mowing ; it must stand to seed : and when the seeds have scattered themselves, sheep must be turned in to feed. This is a method attended with evident disadvantages, and is often inconvenient : saintfoin requires no such management. Let a ground be once well covered with it, and it will take care of itself afterwards ; when it is thought fit to plow up the land, corn thrives excellently upon it : the method of doing this, we have shewn already.

Any soil will do except chalk : on very poor, stony, and sandy grounds it will do very well : and though it be a plant that naturally roots very deep, yet it will thrive where the mould is but shallow : its deep rooting is a great advantage where there is compass : for this makes the leaves of saintfoin look fresh, and serve excellently for cattle ; when all others are parched with a drought in hot summers. The sun can take no effect upon a root that goes so deep ; and it always finds nourishment there, while the superficial mould in which clover, and such other things are rooted, is scorched and dried up.

Saintfoin is an excellent crop any where, but it will answer best of all in those places where manure is scarce : it may therefore be considered as one of the best crops the farmers in the remote counties can take into their hands. They need not be afraid of a stony bottom under the shallow mould in these places, as that is a common condition of much of the land there, for the saintfoin will push its roots through the cracks that there always are in beds of stone near the surface, and by that means find nourishment lower.

CHAP. XVIII.

*Of sowing saintfoin, and managing it while on the ground.*

**S**AINTFOIN so far partakes of the nature of clover, that it may be sown either alone or with corn ; or it may be sown entire, or with a mixture of ray grass. This latter method



thod is not of that advantage that it is in the case of clover, for saintfoin is very well able to fill a land alone, and it has not the inconveniences that attend clover, in disordering the cattle which feed upon it.

The most usual way at present is, to sow saintfoin with barley, and this in the common method of husbandry, is a very successful practice. Let the ground be plowed three times, to get it into a very fine condition; for as clover requires this, in order to produce a tolerable crop, saintfoin renders it more necessary; and it is very well worth while, because of the long time this plant will last.

The land being broken by tillage, should be manured with mellow dung, or some of the richer additions in a small quantity, as foot; than which nothing is better. This done the barley is to be sown, and after it is harrowed in, the saintfoin is to be sown by the broad cast-way. But let the person who does it have a caution given him, to scatter the seed very thin, and sow it twice in a place. This is the only way of raising a crop of saintfoin according to the common methods, with any tolerable degree of regularity. When sown, the ground is to be harrowed lightly over, and nothing more is to be done till the time of rolling the barley, which is also of great use to the saintfoin.

Those who sow saintfoin with oats must use the same general method as with barley, but the former is always the better.

Saintfoin may be sown alone in spring; but that is not the best practice. It may as well be got into the ground the October before, and by this means there will be a crop of it a year sooner than there would be in the common way. The choice of the seed depends upon the same particulars as that of clover, it should be clean, heavy, dry, and of a shining surface. The freer from husks the better.

The difference in respect of the quantity of seed to be allowed in this, and in the drill husbandry, is very considerable: five or six bushels are commonly allowed in this way of the broad cast sowing, to an acre, and less than four is not sufficient; the other is rather too much. When ray grass is sown with saintfoin, the general proportion is five bushels of saintfoin seed, and one bushel of the ray grass to the acre.

When saintfoin is sown alone, if the weather be dry at the time of its coming up, 'tis very apt to take a stint in the growth, from which it is a long time recovering; this may be prevented by watering it by means of a cart, with a convenience behind pierced with holes. In the new method of husbandry this  
would



would be easy ; and it has been practised in the common way with very good success.

When saintfoin is sown in spring with barley or oats, the sooner it is got into the ground the better.

In a succeeding chapter we shall treat of mowing saintfoin for hay ; but here we are to consider the best method of feeding of cattle upon it while on the ground. This is a very profitable practice, but it requires some management. The cattle are not so apt to hurt themselves with this as with clover, but they may easily damage the crop ; and when the farmer finds that it is one of those crops calculated for lasting several years, he will understand that it is worth while to guard against such accidents.

To know how to do this best, he must acquaint himself with the nature of the plant. Saintfoin is very strong and hardy, and is not easily injured when it is well established in the ground ; but at first it is very easy ; especially at the top of the root, where the damage is not readily recovered.

Let the farmer be tender of his saintfoin the first year. The most likely methods of hurting it would be the putting large cattle into the ground while the plant is young, for its sweetness will tempt them to eat it down close, and by that means they will hurt the head of the root ; and at the same time their feet would increase the mischief by treading of it down.

If the farmer finds it needful to put any of his cattle into a saintfoin ground the first year, sheep are most profitable ; but it is best to omit this entirely.

The best method is to mow it the first year, cautioning the scythemen to be very regular in their work, and not to come too close to the root : the next year sheep may very well be fed upon it ; and after this it will have got so much strength that it may, without hazard, be used according to the farmer's circumstances and discretion in feeding and mowing.

We have named twelve years as a time during which saintfoin continues very good and strong ; but in this all that is to be done is speaking generally and in round numbers, for according to the nature of the ground, and the usage the crop has received, it will in some places be worn out sooner, and in some it will last twice that time.

When worn out it may be plowed up and sown again, or another piece of ground found for that purpose, and corn sown on this : but it may also be refreshed by manures. Of these none answers the purpose so well as marle. A tolerable quantity of this spread over a decaying piece of saintfoin, will renew it for several years ; and there are circumstances under which



which this may be very well worth while. Rotten dung may be used for the same purpose, or foot.

Feeding upon the saintfoin is an excellent thing for cattle: it is full of a rich nourishment, and yet is not rank. It fattens them, without breeding disorders. Spring is the season when it best answers this purpose fresh; and this is most convenient to the farmer: the only caution is not to put heavy cattle upon it in wet weather: in any other season, when the crop is well established, they will not be able to hurt it.

Autumn and winter are the most proper times for sheep: this also very well answers the farmer's purpose. The great shoot of the spring is sufficient for cows and oxen, and the crop recovers itself for one mowing, after which there grows a young shoot that serves very well for sheep, at a time when they want it; and they neither damage it by their close eating, nor heavy treading. No food fattens sheep so freely or so suddenly at that season, and none is better for oxen in spring, or for milch cows, when eaten upon the ground, or green in the rack: it causes abundance of milk, and does not give it that strong and particular flavour which it has from the feeding on clover.

These general cautions must be enlarged or retrenched, according to the soil and other accidents. In a dry soil and dry season large cattle may be turned in upon the growing crop, earlier than we have said; and in a moist soil they must be kept out later. Nothing establishes itself more firmly in the ground, giving it time; but when it is trampled young, in a damp ground and wet season, it is damaged in such a manner, as never to recover.

#### C H A P. XIX.

##### *Of mowing of saintfoin, and the uses of its hay.*

**A**S fresh saintfoin is excellent for horned cattle, the hay is one of the best known foods for horses. There is a particular management required in keeping the ground for hay, but it is so like that used for clover, and indeed for natural grass, that the farmer will need few words to explain it.

To have a crop of hay of any species, the ground must be laid up a proper time. The time for laying up saintfoin is the latter part of March, and two months will bring it into a condition for mowing.

Saintfoin is to be mowed like clover just when it gets to flower, only the saintfoin may be allowed to stand till a little forward in bloom: it must not be suffered to remain till the bloom begins to fade, and the seeds to be formed. In clover  
the



the greatest benefit rises from cutting it just when the heads are all formed, and but few of them have opened ; in saintfoin the exact time is when a good number of the flowers have opened, but none are faded.

It is to be made into hay, by frequent and careful turning : it requires more care and pains than common hay, but not so much as clover ; the leaves and stalks not being so juicy.

The propagating saintfoin for its hay, is of great importance to farmers, in many of our corn counties, for the nature of their land in many places is throughout ill adapted to pasturage ; and the profits from corn are so great, that little is used for that purpose in others. In some places this is carried to such a height, that there are large farms in those parts of the kingdom that have some very little, and others no land of the common pasture kind, so that the people who occupy them can scarce keep any cows in most, and in some find it very difficult and expensive to support their horses. The introducing of saintfoin must be a thing of great convenience to these : it is bringing in a crop that will be managed with ease in their own way, will grow on the common run of their grounds, and will come in the natural course of their tillage : and this will feed their horses and other cattle, and if they chuse to cultivate more of it will bring them a great profit at the market.

A field of saintfoin will, in such a case, make a prodigious change in the farmer's affairs. He may feed cows, if he have ground near home, with fresh cut saintfoin during the whole summer, under cover in racks ; and in autumn and winter he may turn them in to the aftermath of it, only observing to favour the ground in wet weather. When winter is advanced he may turn in his sheep ; and then feed the cows under cover again, with the hay cut at the midsummer mowing, and in spring turn them into the fresh growth of it again. This is a prodigious thing in counties where natural grass is scarce ; the farmer in these places used to be confined to the single article of his business respecting tillage, and the growth of corn ; but by the introducing this plant, he is able to undertake the whole, and share the advantages of those more happily situated, part of whose land falls out naturally for pasturage, part for corn ; and who find it easy to keep up such a proportion, as makes them mutually subservient to one another.



## CHAP. XX.

*Of lucerne, its soil, and the manner of sowing it.*

**L**UCERNE is one of those plants we have introduced from abroad.

It is one of those which serve in the place of natural grass, and are therefore called artificial ones. We have said the less of saintfoin in this place, because it had been treated of before. Lucerne having not been mentioned yet, we are to consider it here at large.

It is a pretty looking plant, with blue flowers. The root is long, and of considerable thickness. The stalks are firm, upright, and branched; they have great numbers of leaves growing three on each footstalk; and the flowers stand in little heads, followed by a kind of twisted pods.

It answers the purposes of saintfoin, and endures many years.

We had it from France; but the Romans have written of it; and by the labour and expence they employed in its culture, it is plain they were acquainted with its value. They called it *MEDICA*, and we find frequent mention of it in all their writers, who treat of agriculture. They preferred it before all plants as a fodder for cattle; and they had reason: nothing excels, and perhaps it would not be too much to say, nothing equals it. With this character, which is vouched by the experience of husbandmen in other countries, and in no part contradicted by the trials made in England, we hope it will become more known, and in time universal.

We have shewn the great benefit there is in saintfoin, and there is the same or more in this. The antients have left us accounts concerning its effects in fattening of cattle, hardly to be credited; but the relations the French, among whom it is more commonly cultivated, give of it, and what I have seen of some raised in England, seem to give reason to believe those relations are not much exaggerated.

It is sweeter than clover, and has so many advantages, and so few objections have been raised against it, that the only reason why it has not been more generally introduced, seems that its culture is not sufficiently understood. In this there is nothing difficult: we shall lay down a method supported by some experience.

Lucerne will grow on any soil. This puts it in every farmer's power to raise it. It will thrive best on the richest; but there is none where it will not be of equal benefit with any other crop.

The antients gave it the best natural soils they had; they improved



improved these with all possible care by manure, and tillage : there is no crop for which we dress the ground in so laborious or expensive a manner ; and it is beyond a doubt, that if we would follow their example in taking a great deal of care of it, and bestowing a sufficient expence and labour upon it, we should reap proportionable advantages.

They had not the right knowledge of its most advantageous culture ; they sowed it thick : which, by what we see, must have had a bad effect.

The root of Lucerne being large, is enabled to support a head of numerous stalks ; and this is the method by which it will be most serviceable to the farmer. This can only be promoted by its standing at a distance one plant from another. On this depend the great profits from Lucerne, and this the antients had not ; nor can we have, in the common method ; for our farmers have run into the same fault : they have sown it so thick, that the plants starved one another.

It is easy to see, the drill method must be fitter for this than the common, because that way the plants will stand remote, and will be vigorous : this will also be farther promoted by the horsehoeing, in a manner which it can be no way else. It is to these deep rooted plants, that method of culture is particularly adapted. They spread under the ground by large and numerous fibres ; and this deep plowing between the rows breaks the earth about them while growing.

The benefit of breaking ground while plants are in it is plain : and by this means it can be done at times during all those years the Lucerne stands upon the ground.

This plant, as soon as mowed, sends up new shoots in abundance, from the part just below, where the scythe cut off the top : these are much more quick in appearance, and more numerous than in any other field plant ; and they furnish an immediate second crop.

This is greatly to be promoted or retarded by the growth of the plant ; which will depend upon its distance, and manner of culture. In the common method of husbandry it is set too close to be well nourished : in the other method, the plants stand clear, and the hoe plough supplies them continually with new stores of food. In this way, the shooting of a new crop will be almost instantaneous. The French have introduced this method of husbandry into their fields of Lucerne, from the writings of Mr. Tull, our countryman ; and they boast greatly of its success. It is a reproach to us that other nations have the advantage of labours undertaken in vain for our service.



From this sudden and strong shooting the lucerne yields many crops : we see clover will very indifferently afford them ; two is all it can be made to give with full advantage ; and from faintfoin, the best practice is to take but one a year. Lucerne yields seven crops a year in the south of France, and all large ; and in other places, five or six according to the advantage or disadvantage of season or situation : in England we may, by the horsehoeing husbandry, render it capable of producing more than will be easily credited by those who have not experience of the nature of this plant, and the effect of that cultivation ; but the very advantages of our soil and climate, when proper care is not taken, otherwise make against it.

Wherever lucerne is planted, the greatest danger is the growth of common grass amongst it. Lucerne always declines as this advances ; and by that time it comes to spread and turf, the crop will be good for nothing.

There is no country where grass turfs sooner than in England ; therefore no place where a crop of Lucerne would be so soon over-run and destroyed ; but then by the drill and horsehoeing husbandry, it is easy to prevent this accident ; and that moisture of the ground, and mild temperature of the air, which would encourage the grass, will also forward the growth of the crop.

The good crops of lucerne in France and Italy, are, in a great measure, owing to the sun drying up the natural grass : when there happen any considerable rains there in summer, the crop is poor ; with us there never could be expected a good one, if we could not prevent this accident of grass ; but it is plain by the horsehoeing husbandry we may. People knowing the danger to which it was liable from grass, have sowed it thick, that it might starve any that should attempt to rise among it. The antients followed the same practice, and gave the same reason : with them the error was not of so bad consequence, because they prepared their land richly ; but with us it is always destructive, for it starves itself when sown thus thick ; and being starved, the grass grows more easily among it.

We have seen many trials made in this manner, and all unsuccessfully : the natural grass has grown up among the crop, and the other has proportionably declined ; till in a very few seasons a pasture of lucerne has been changed into one of common grass, with only just as much of the right plant as would serve to shew it once grew there. As lucerne draws its nourishment deep, the upper part of the ground will always support grass ; and in England, wherever grass can be supported,  
it



it will grow. Nothing but breaking up the ground about it, while growing, can prevent this accident; and no method of culture, but that by the drill and horsehoe, admit this practice. It is plain to reason that this method will suit lucerne better than any other, but that it never can be raised advantageously in England any way else.

In France and Italy they plow between the rows, where it is less needful: and there is double reason why we should do it here. In those countries it serves but one purpose, which is breaking the ground to supply nourishment; but with us it will answer two, the giving nourishment to the plants, and destroying the grass.

Our driest summers never damage it, when cultivated by the horsehoeing husbandry; for the dews will supply it with nourishment, which the earth broken by the hoe, will be ready to detain for its service. The heat of our warmest weather will only be serviceable to it; and it will find food in the driest time, when the ground is open thus to the reception of the dew.

The cold of our winters is not to be feared. Experience shews lucerne will thrive where many of the garden plants, that stand the winter with us, perish: if it can bear a colder winter, it will be safe from injuries in ours; and from this, and all other considerations taken separately first, and afterwards together, there is reason to believe that England is a country where this plant may be raised as advantageously, as in any upon the earth: there only requires a proper method of culture.

#### CHAP. XXI.

##### *Of the most proper soils for lucerne.*

**L**UCERNE will grow on poor or rich land: at present it grows very well in France upon poor soils, with no great expence of culture, but under the advantage of the horsehoe: what there is in the ground most favourable to it is warmth, and a due depth; what is most injurious is a bad bottom. It is easy to conceive, that a plant which roots so deep, is affected by what lies below the surface; and this has been the reason why it has failed in some parts of England, where grass has not been very troublesome. I have seen tolerable care used about it, and yet it has not thrived; and, upon examining, have found under the soil a bed of tough clay. This is an under-stratum very disadvantageous to many growths, but to none so much as to lucerne; for it detains water about the roots, and at the same time chills it; so that many of the plants die, and the rest dwindle away.



As lucerne is a native of a warmer climate, we should give it our warmest soils. A good loam, with a large portion of sand, and mellow earth among it, and with very little clay, is the most favourable soil of all for us. Next to this may be accounted that dry crumbly earth we have in many parts of Buckinghamshire, which is a composition of mellow earth and sand; after this a warm, and not over-barren gravel is to be preferred; and, lastly, any sandy soil that has some degree of richness; for it will not prosper in absolute sand.

Of all these soils the gravelly succeeds best, in the particular effect of ripening the seed; and, in general, such places as are too moist from frequent little springs are worst, though their soil be ever so favourable.

Too much water is destructive of this plant in England; whereas in France and Italy, it never succeeds so well as when near the banks of rivers and springs; but there the heats are greater, and it therefore requires more refreshment. Though we do not recommend that tedious culture, which was given to lucerne of old; yet we shall advise the farmer who intends to plant it on a poor soil, to enrich it with the manures most agreeable to its kind. He should thus prepare the ground for the plants; and when they are on it, he may, if he please, occasionally refresh them with a little more.

This doctrine is not agreeable to the system of those who would have the use of the hoe plow supersede that of dung. We have said already, that no method of culture answers so well as this for lucerne; nor indeed can it be raised beneficially by any other; but we advise the assisting this practice with manures for the sake of frequent crops; these depending upon the quick growth of the shoot after mowing.

#### C H A P. XXII.

*Of the sowing of lucerne, and managing it in the ground.*

**T**HE antients sowed lucerne in the beginning of April; at present they have two seasons for it, both in Italy and France; the first is in March, the latter in October. The Romans erred in sowing it so very late in the spring, because there wanted rains, and they were obliged to water it: the present practice in those countries is better; and, in general, the October sowing is most profitable; the plants having time to root themselves well in the winter, and the wet season assisting them greatly in their first shoots.

The difference of climates is so great, that it would be very prejudicial to attempt introducing the methods of husbandry from Italy into England in the same form: it is proper for our  
farmers



farmers to know them, that they may perceive on what their success depends; but they must be accommodated to the climate. If we sow lucerne in autumn, it will be in some danger from the winter. However, the farmer knowing this, may, if he pleases, stand the hazard. Young lucerne will be destroyed by those winters which will not affect it in a more established growth; and in the same manner, a field of it that is ill managed, and poor, may be hurt by frost, when one that is in better condition escapes. As to the October sowing, if the winter be severe, and the soil unfavourable, the crop may be lost; if it should prove mild, and the soil be agreeable, the lucerne will stand; and it will have got such strength, that it will make much better head early in the succeeding summer.

As we would not lead the farmer into hazards, we shall advise him not to think of the October sowing, but to limit himself entirely to the spring, and to wait till late in that season, that the danger of the frosts may be over.

We have blamed the husbandmen of Italy, for deferring their spring sowing till April; but we shall recommend that practice to the English, and advise the deferring it here till toward the middle of that month.

Sowing earlier, may, in some years, succeed better; but this depends upon accidents, and we would not have the farmer liable to them in a new undertaking. If it be sown in March, and a mild dry time follow, it would be better than later; but in other cases, the expectation of a crop is easily destroyed: if a great deal of wet come soon after sowing, it will rot the seeds in the ground; and if frosts of any power follow the time of its coming up, they will utterly destroy the crop.

The quantity of seed to an acre, must be determined by experience; but sowing it by the broad cast, which has been the custom in England, is by no means proper; and a larger quantity of seed than needful has been allowed. The method we propose by the drill, will determine the needful quantity. The plants should stand at about seven inches distance in rows, and these rows should be at a yard one from another. It will be possible to work the horsehoe in these, and the plants will be well supplied with nourishment. The farmer need not be afraid of having a sufficient quantity of plants upon the ground; for each, if rightly managed, will, when grown to perfection, have from a hundred to two hundred stalks.

When lucerne is sowed thin in drills at a yard distance, in the middle of April, upon a proper soil, the moisture and warmth of the season soon bring it up. When it has a little height, the farmer is to send in some hand hoers, to hoe up the young



growth of weeds, and to thin the plants where they have come too thick, leaving the most promising at the rate of about four in every two foot. They are not to thin these to exactly six or seven inches distance each, but to preserve the best plants in about that number. These hand hoers are not to meddle with the middle of the intervals, but only to destroy the weeds, and break the surface of the ground about the rows.

This done, the plants are to be left to themselves till they are of some stature: then the hoe plow is to be sent in, and a tolerably deep furrow is to be turned in the centre of each interval.

This is to be repeated as often as weeds appear, only leaving here and there an interval unplowed for the convenience of making the hay.

The intervals left at one time may be plowed up at another; but in that case there must be some made smooth by rolling, at proper distances.

Lucerne will thus thrive very well till grass begins to grow among it, which it is apt to do, to the destruction of the crop.

In this case there must be a good furrow plowed from each side of every row; and afterwards there must be harrows brought in to the ground, and drawn crosswise; these, without injuring the crop, will tear away the grass which the plow has raised, and such as grows among the plants; after this, the two furrows first plowed up, beside each row, are to be turned again upon them; and there will be the double advantage of clearing away the grass, and giving the roots a fine quantity of fresh earth for their nourishment.

The grass that was before left upon the ground, and half killed by the sun, will be thus buried and thoroughly destroyed; and after this it will not be able to make any head again for a great while.

The thinning of plants in the rows by the hand hoe, must not be done till they have got some strength, for fear of accidents. The sweetness of the lucerne leaf, when very young, makes it liable to damage by the fly, therefore it is proper to see that danger over before it is thinned: when the plants have got some strength, this insect never attempts them.

Horsehoeing afterwards is to be repeated oftener than to any other species for this reason, that it is to forward so great a number of crops. Those who have hitherto raised lucerne in England, following the common method of husbandry, have contented themselves with two crops a year: but we see what it yields in other countries, and by the same management we may bring it nearly to the same richness here.

If the farmer should have neglected his lucerne, so that the  
natural



natural grass should become a turf, and the plants appear in a decaying state; the four coultered plow is then the instrument.

This breaks and tears a turf to pieces, be it ever so tough and thick: with this he is to go round every row, turning the furrows toward one row, and from the next, the first time; and the next, from the rows they were turned toward before, and to the others: thus taking care not to hurt the plants by letting the furrows lie too long upon them, the grass will be destroyed, and the plants will recover.

There must be some intervals left as in the common course for the making of the hay; and there will be found no difficulty of making this most valuable plant succeed perfectly well in England, and afford its numerous crops as in other countries.

### C H A P. XXIII.

*Of the value of lucerne, and manner of using it.*

**T**HE superiority lucerne has over other grasses, is in the frequency of its crop; and this is encreased by its natural richness, and wholesome qualities.

The others are to be used partly by cutting, and giving them green in the racks, partly by drying into hay, and partly by feeding on the ground; lucerne would answer all these purposes, but it is better to spare the last; for the feet of large cattle would tread it down in such a manner, that the owner would lose much more in his succeeding crops, than would equal the advantage of that feeding. In the other two methods it answers excellently, and a part of it may be given fresh cut and green all the summer, while the rest is making for the winter service, or for sale.

The best season for giving it first to cattle green, is spring, because its natural effect is purging first, and afterwards fattening them: but in this, as in clover, there is some danger of making them swell at first, if given injudiciously: to prevent this, use the same precautions as with clover, giving them straw among it first, or beginning by a little at a time.

This way it is safe for all cattle; nothing strengthens or fattens a horse like it, and no food makes cows yield so great a quantity of rich milk.

The danger of cattle's hurting themselves by it, will be avoided by their not being turned into the fields, to eat at their pleasure.

In this manner of using, a field of lucerne will continue in heart many years; nay there is no saying when it will be worn out.

The making it into hay is of great consequence. The profit is large, and therefore it is worth the farmer's while to be strict in observing all particulars.



The principal are two, that it be cut young, and that it be well dried. As to the first it is to his advantage in every respect, for the hay will be sweeter, and the next crop will come much sooner than if more time were lost, and the roots exhausted,

The exact and proper time for cutting lucerne is when it is preparing to flower, but has none fully open.

The flowers of this plant stand in little heads, and the plant must be watched carefully for their appearance. As soon as they have formed themselves is the time of cutting the crop; and the roots being full of vigour, there will be a shoot of four or five inches high, while the hay is making.

There is no appointing the exact times of mowing the several crops, but it will be easily found by observation. The first must be cut as soon as the plants are in this condition; and the others as they successively get into the same state again after every mowing. The stalks of this plant grow stubby and hard, when it stands too long; but they are by this means cut while it is tender; cattle are fondest of it when in this condition; it leaves the roots the strongest, and the next crop follows quickest; and being cut in the same manner, when just getting toward flowering, it serves in the same way the farmer's purposes best, and makes preparation for the next in succession. The field of lucerne yields from time to time, during the whole summer, successive crops, and all very large, of an excellent hay. With respect to the horsehoeing, the oftener that is repeated the quicker the crops will follow one another, and the more plentiful they will be.

While lucerne is in this proper condition for cutting, the stalks are single, upright, and of a pale green: after this, when the flowers begin to open, they become branched and grow yellow, and then they soon will be sticky, tasteless, and unprofitable.

The mowers must have one caution, to keep their scythes sharp, and go on evenly throughout the ground, for on the smoothness of the top depend the quick and numerous springing of the shoots.

When mown it is to be spread upon the intervals left plain, or rolled smooth for that purpose, and carefully turned and dried. It requires more care in this respect than clover or saint-foin, for it is more apt to damage afterwards. It is apt to deceive the farmer, for it will seem dry when it is not thoroughly so, and in this case will be apt to get damage afterwards, and so spoil the hay of other crops that lie near it.

The seed is usually imported from France, but it is possible to bring it to ripeness here; a warm dry gravel, well exposed,









*The  
Lentill or Till*



*The Chick or Thetch*



*The Fare*



*Lucerne*



*Saint  
Foin*



*Clover*



*Buck Wheat*



*Spurry*



*Ray Grass*



*Hop Trefoil*



is to be chose for this, and the plants are to be thinned to a greater distance. They will rise into large and numerous stalks, and these must not be cut down at all, but left to follow the course of nature: their flowers will thus appear in great abundance, and after them the pods, in which, if the season be favourable, the seeds will ripen to all the perfections of such as are brought from abroad.

# C H A P. XXIV.

## *Of hop trefoil.*

**W**E have before spoken of the uncertainty in husbandmens expressing themselves, concerning the plants they cultivate. This is another instance: they call this plant trefoil, and three leaved gras. This is the case with the writers on husbandry, as well as those who practise it, and in them it is most unpardonable. When they propose to inform the ignorant in the use and the management of a plant, from which a profitable crop may be raised, 'tis fit they should first inform them what the plant is. This they think they have done when they have called it trefoil, or three leaved gras, not knowing, or not considering, that these are the names of no particular kind, but of all those plants which bear three leaves on a stalk. Trefoil is the name of clover, and of all the other plants of the three leaved kind, therefore there requires more distinction. The plant cultivated under the name of trefoil in certain counties, may be known under that name in those places; but the inhabitants there do not want the information: he who writes does it for the service of all persons: those to whom he can be most useful upon that head, are such as live in counties where the plant is not cultivated, and who, by this means, may bring it into use. These can never know what the plant is by such a name: it is needful to distinguish it by one more particular, and to establish that name by a description. This is the course we have followed in the present work.

There are many plants which have the leaves always three on a stalk, or three at a joint, and these are all called trefoil, but with the addition of some word, by which the kind is distinguished; one of these is this trefoil, simply so called by the farmers, and raised like the other artificial grasses for feeding their cattle: the distinction of this is, that the flowers grow in small heads, resembling a hop; and from this it has been called hop trefoil or hop clover; and in Latin trifolium lupulinum, which means the same. There are more kinds than one of this hop trefoil, but the largest is that chosen for culture. Under this name the plant will be found treated of by all who have written  
on



on herbs, and the farmer knowing it by this name, will be able to inform himself and others about it.

This, though the largest of the hop trefoils, is but a small plant, but it grows thick, and makes amends for the want of height, by the number and quantity of its stalks.

The root is whitish, slender, and hung with fibres; the leaves stand three together, and are small, oval, and of a pale green: the stalks are eight inches high naturally, but they may be made taller by careful management; the flowers are small and yellow, and they stand in oval tufts, which in a certain state much resemble hops: the seeds follow, and are contained in dark coloured husks, and stand in a head or cluster of the same form.

It is a native English plant, and therefore stands all weathers, and all seasons: for the same reason also it sows its seed, and continues itself upon the ground better than any of the foreign kinds, and is up earlier in the spring. This gives it a considerable value with the farmer.

This was one of the first improvements made by the English farmers, in the way of the artificial grasses; but since the introduction of the others it has been less regarded, though on many accounts it is very valuable: it ought always to be remembered, as one of the many crops by which he may vary his course to the ease of his land, and his own great advantage.

The soil that suits the hop trefoil best, is a soft mellow earth; next to this it prospers in a light rich loam: it will grow on almost any ground; but best on these; and worst of all on such as are clayey or wetish. The farmer who has a dry piece of ground, and has a mind to hop trefoil, need not scruple sowing it let the other condition of the ground be what it will: he will have a better or a worse crop according as the soil more or less suits the plant, but he will never fail of having enough to answer his common purposes. Hop trefoil may be sown alone or with corn: it has also a third use, which is, the propagating it in common pastures. This is done by sprinkling the seed among the grass, where it freely comes up, and thickens it and improves the quality.

In the field, whether alone or with corn, it may be sown either in the husk or naked. For a general rule we shall tell the husbandman, that if he sow the seed naked and clean, he is to allow twelve pound weight of it to an acre; and if in the husks he is to measure it, and allow to the same ground two bushels.

He will by this distinction have some general guess, at the meaning of those practical writers, who are less nice in their explanation: when he reads of trefoil seed by weight, he will know



know it is meant of the clean seed ; when by measure, of that in the husk.

As this is the plant never expected to grow large, we shall advise the farmer to sow it at random, in the broad cast-way ; and prefer the seed in its husks, rather than naked. This defends it from insects, and from damage by wet till it shoots ; it makes it spread easier from the hand, the quantity being larger, and it shoots the quicker for it. This was the intent of nature, for the seed falls to the ground husk and all ; and we should be wiser than we are, if we took pains to follow her instruction and example in more instances.

The farmer sowing two bushels, by the broad cast-way, will have a thick promiscuous crop early up ; and it will be continually thickening itself more by the shedding of its own seed which never fails to grow in abundance ; it will do this even when eaten upon the ground, the flowers being very numerous, and ripening in such a succession, that there are always some heads ready to shed their ripe seed : but if it be let to stand for hay there will be millions of new plants.

There are two seasons for sowing this trefoil, autumn and spring, either alone or with his winter or summer corn ; but it will succeed best sown alone.

The earth requires no great preparation for this crop, for the plant being wild will grow any way. The seed will not grow if it be buried too deep. This will instruct the farmer to sow it in such a manner, that it may be lightly covered ; and afterwards to bury it by deep plowing, when he intends another crop ; for without this care it will rise among the corn when not intended, and often be prejudicial.

For sowing this, he should chuse a calm day, for being large and light, the wind would take effect upon it, and scatter it unequally, however steady and careful the hand were that sowed it.

When it is on the ground the best method is to draw a roller over it, and then to harrow it lightly. This is more trouble than many take, but it is not much, and the advantage in the crop will answer it. The rolling alone would be sufficient, but that if a shower comes it loosens the seeds, and if a windy day follows, it scatters it at random. In the harrowing great care must be taken to do it light, otherwise the seed will be too deep buried.

The crop will rise quick, and increase in value every year. It may be fed or mowed at pleasure, and the best management is to do both at the proper times. It is hardier than any of the others, and less liable to damage : cattle are very fond of it when cut and given them fresh in racks, but they may be turned  
into



into the field also almost at any time without hurt. Of all the plants of this kind none is so wholesome as the hop trefoil: some sow a proportion of it among clover, to prevent the effect of that plant, in swelling and disordering the cattle that eat it. They grow very well together; and the right proportion is five parts of clover seed, and one of clean hop trefoil.

The early appearance of this trefoil is of great service to the ewes and lambs in spring, and also to cows and oxen.

The greatest inconvenience is, that he finds a difficulty to clear the ground of it when intended for something else; but we have given the method of doing this effectually: it is only to bury it by a deep plowing, for neither the seed nor root will grow when they are covered to any depth.

#### C H A P. XXV.

##### *Of ray grass.*

**T**HE farmer calls many of those plants which he sows for answering the purposes of grass, by that name, though of different kinds; but this ray grass is properly a grass only of a particular and valuable species. Its use is the same with that of the several kinds last mentioned, the sowing for an early food for sheep and other cattle. It is hardier than any other; and having the appearance, and with it the nature of the better sort of the common grasses, it is the most easily propagated of any. It is hardier than the hop trefoil, and comes in earlier.

There are a great many species or kinds of natural grass, differing in greater or lesser particulars among one another. Ray grass is one of them, its proper name is darnel, in Latin *lolium*. There are two kinds of it, the white and the red, so called from the colour of the joints of the stalks. This is the distinction as to colour, but they differ also in size and quality. The white is the larger, and the red is the hardier of the two. They are both wild kinds, but it is a great advantage to the farmer to sow them. The red or smaller darnel is the best, because it is earlier and hardier than the other: and sends up more numerous leaves. The farmers do not understand names much, and they have in this article let in some confusion. The proper name of this grass is darnel. It is called ray grass, and this some write raye grass, and others, according to their notions of spelling, rey grass. This rey has been spoken as if it were rye, and thence others have written it rye grass: now rye grass is an English name of another kind of grass, one of the most unserviceable of all the kinds: it grows by way sides, and has a bearded ear resembling that of barley. This, instead of being cultivated for use, should be rooted up wherever it comes: yet



yet this seems to be directed to be sown and cultivated, by those who write ray grass in that manner.

Ray grass is of a middle stature, growing to a foot and half high. The root is a tuft of thick and whitish fibres: the leaves are numerous, and of a fresh green, they are narrow and sharp pointed, like those of common meadow grass, but shorter.

The stalks are numerous, and rise among the leaves; they are round, green, firm, and toward the bottom very much jointed. The top of each stalk is crowned with a kind of ear, long and thin, composed of several little clusters of husks. In these are contained the seeds, which are not unlike the grains of corn, but smaller.

The leaves are more numerous when it has a good soil, and the stalks, if permitted to rise to their height, will be much taller; but this is not the farmer's interest, for as they grow large they grow hard, and are less useful.

Ray grass may be sown either alone or mixed with clover, which last is the best way of managing it.

Any soil will suit it. We have been obliged to caution the farmer, against sowing several of the last-mentioned plants upon clayey or wet ground, because they will not succeed thereon; but this is a grass for land that will support no other. It will grow to advantage on cold, wet, spewy, and sower land.

Some crops intended for the food of cattle, are destroyed by a dry summer, or rendered of little value; but this is not the case with ray grass; no drought of summer, and no frost or wet of winter hurts it. The farmer should always have some land sown with it, because it will stand him in stead when all the rest fail. It is a good winter food for large cattle, and one of the earliest spring crops for the smaller: and at the same time there is none more wholesome.

Ray grass feeds horses in a hearty manner, and is of so dry a nature that it will prevent the rot of sheep.

No field will bear so large a stock upon it as one of ray grass, because nothing can hurt it; nor is there any harm, but rather advantage in eating it close, because the worst damage that can attend it, is growing too high. The stalks are as tender and full of nourishment as the leaves when young, and they grow up immediately after biting.

When the farmer sows ray grass with his clover, to correct the bad quality of that grass, a small proportion is sufficient; but when he intends to have the full advantage of the crop in feeding his early cattle, he should enlarge the quantity. Three bushels of ray grass seed is a very proper quantity for an acre,  
in



in a mixture with clover; or more may be allowed. After these hints, the husbandman will be able to proportion the quantity to the service; and as the common custom is to sow a great deal of clover, with a little ray grass among it, he will often find it prudent, where he is to depend upon the pasture for a considerable time, to sow it with a great deal of ray seed, and a little clover.

Ray grass makes clover last many years longer than it naturally would, in whatever proportion it be mixed with it; but if the farmer chuse to allow it a large share, the pasture will be good as long as he pleases. Ray grass, hop trefoil, and clover, will grow excellently together, where the soil is tolerably dry: in that case there is no way of making a richer pasture, than by sowing a large share of the ray grass, with an equal mixture of the other two, in about an eighth part proportion of each to the ray seed.

Beside the excellent quality of ray grass, in growing on clayey and other bad soils, it will in a powerful manner destroy the worst weeds. Where ray grass is the principal growth, there are few thistles, and if those are but once tolerably got up, they never rise again; the reason is plain, and the fact of great importance. Ray grass covers the ground with so thick a turf, and draws so much nourishment, for the supply after its constant cropping, that no seeds can get in, and if they do the young plants that rise from them are starved.

The mowing ray grass requires a great deal of consideration, it makes good hay, and its seed falling from it, in that condition, is of some value; but here the two points of profit interfere with one another, for if the grass be cut young the seed will not have its full size or hardness; and if it be let to stand longer for that purpose the hay will be harsh.

The farmer should take a middle course, coming in when the seeds are beginning to ripen, and the stalk is yet tender.

If he want the seed for sowing, he must let the crop stand somewhat longer, and be content to spoil his hay, in some degree: on the other hand, if he have no regard to the seed, he should cut the ray grass when the ears are beginning to form themselves: he will thus have an excellent hay, and the roots being unexhausted by ears, will send up a fresh shoot in a speedy manner, either for feeding on the ground, or for a second crop.

The seed brings some price; and when the crop is suffered to stand for it, four quarters will sometimes be got from an acre. This at two and nine-pence a bushel, which may be called a moderate price, is worth some loss upon the article of hay. Some who think of the hay as the principal crop only, gather  
such



such seeds as are found at the bottom where it is put up; but in this case, where a profit is depended upon from the seed, it should be thrashed in the same manner as corn: and the hay, far from getting any injury by this management, will be the better.

If the crop of ray grass be thin, it may be thickened by sowing more of the seed. If this be scattered at random among the grass, it will take, and encrease the quantity; a bushel or two may be used for each acre. The best season is spring, but it may be done in October.

This grass has often saved the farmer's stock of sheep and lambs, early in the spring, from starving. At all times it is an excellent preparatory for the richer artificial grasses which rise after it.

#### C H A P. XXVI.

##### *Of long grass.*

SOME have supposed what is called long grass in Wiltshire, to be the same with ray grass, but it is a great error, that is a kind of water grass, with long stalks, which will grow but in few places: it is useful where it will take, but it requires a rich soil, and a proper degree of moisture, so that it is in vain to think of making it universal. This kind ripens its seed but poorly. When the farmer happens to have a rich wetish piece of meadow ground, he may try this species. 'Tis to be found about shallow waters, and may be known by the length of its shoots, which trail along the sides, or float upon the surface. These being stuck into a damp ground, already covered with other grass, may take their chance: if they meet with a soil, and all accidents proper for them, they will thrive and be very useful, if not there is no harm done by the trial. It is worth making in this way, because attended with little expence or trouble.

The place where this grass was first observed, was a piece of meadow ground near Maddington, a few miles from Salisbury; and the effect of it being seen, they endeavoured, but without success, to propagate it in other places. The stalks in this meadow grow to the length of eight or nine yards, rooting at every joint, of which there will be twenty or more in such a length, it proved an excellent food for sheep. The same grass has been observed in other places, and always remarked for its great length: sheep in particular are fond of it.

As to the other species of common grass, none thinks of cultivating one more than another. Those which most resemble the common meadow grass are best, and such as are rushy,  
or



or have triangular leaves with sharp edges, are worst; these are natives of fower land, and watery places. As to the ray grass, when it grows natural among other pasture grasses, it is always an advantage, and we have shewn how it is to be raised to great service by proper culture.

### C H A P. XXVII.

#### *Of spurrey.*

**T**HIS is a plant little known among our husbandmen, and not to be ranked with many of the preceding in utility: however, as it was once sown in our fields, and is at this time propagated in Flanders; and as it is not without its use, we have thought it worthy a short chapter.

Spurrey is a wild plant in this country, and therefore will not fail to succeed easily with any kind of culture; as it naturally grows in corn fields, tillage will always be useful to it; and as it will grow in very poor ground, and come into service late in the year, when other crops are eaten, it is worth some notice.

It is a small weak plant, with little five-leaved white flowers, and a great number of seeds following each in a kind of capsule. There are five kinds of it natives of England. 1. The larger or common spurrey, frequently wild in corn fields. 2. The little annual spurrey, with foliated seeds. 3. The common little red flowered spurrey, wild in dry places. 4. The sea spurrey, frequent on our sea marshes. And 5. The lesser blue flowered sea spurrey.

The common spurrey, and the sea spurrey, are the only ones worth notice; and of these the first only at present is regarded.

The stalks are eight or ten inches long, and divided into many branches not very erect, tender, and of a pale green. The leaves are narrow, and there stand several of them at every joint: at the tops of the branches are placed the flowers, which are small but very conspicuous, being of a bright milky white.

The soil that most suits this plant, is a mellow earth, with a large admixture of sand. It will thrive very well in exposures, and in the most barren places.

The ground requires no great care for fitting it to this crop. There are two seasons for sowing it, the first is in May, and the other early in autumn: in both cases it shoots very quick, and presently covers the ground.

The use of it is as fodder for cattle; and the way of giving it, in Flanders where it is most cultivated, is fresh cut in racks. The produce of the latter sowing comes at a good season, the natural grass having been well eaten by that time, and recovering itself but slowly.

It



It is a wholesome food, and cattle are fond of it: it occasions cows to give a large quantity of milk, and gives it no ill flavour: it also fattens them, and, as is said, occasions hens to lay more eggs than any other food. Those fowls are fond of it, and it never has been found to do them any harm.

Ten pounds of the seed is the quantity for an acre: it requires only to be lightly harrowed in, after sowing in the common broad cast-way, and then will give no farther trouble till cutting, which will be three months after the sowing.

We have mentioned one spurrey beside this common kind, which may be worth the farmer's notice: this is that which grows about our sea coasts. It has not yet been considered, because it is not known among those who should bring it into use.

This sea spurrey is more worthy notice than the other.

There is nothing we want more than to find proper growths for our sea coast land, and this is one which nature has calculated for that purpose. We have a vast deal of ground within the reach of salt water, which is neglected; because being impregnated with saltness, crops will not grow upon it: there would be a vast advantage in finding useful plants proper for these grounds; and if they were but of a moderately valuable kind still, because they grow on what would be otherwise unprofitable land; they would be useful.

We find many pieces of sea coast ground, the soil whereof is too loose and sandy to bear a good turf. On these, which cannot be made to answer as salt-marsh ground, the sea spurrey might be raised with profit. The plant grows wild upon them; and I am able to acquaint the farmer, from experience, that this kind of spurrey is equal to the other so commonly sown in Flanders, and at one time not uncommon in England, in its qualities: let it not seem the fondness for a piece of novelty, that influences me, when I say it is better: it is as wholesome and more juicy; and consequently every plant of it contains more nourishment than one of the other.

This sea spurrey, which we propose to the husbandman, is not unlike the former in its manner of growth, or the shape of its leaves or flowers; but it is shorter, more upright, and has a fuller stalk. It is frequent on these sort of grounds.

It is so plentiful that the seed, though it is not to be bought, may easily be gathered in abundance; a couple of labourers in the month of July, being employed one day for that purpose, would be able to bring in a vast deal of the wild plant; it is at that season very full of the seeds, and they will freely come out on threshing; these may be sown with



the least expence imaginable, and they will that year produce a large crop, at a time when it will be very useful.

When the seeds are got out of the dried plant, they must be spread upon a floor to harden; and after a week they will be fit to sow. That time will be enough for plowing up a piece of waste ground, which will need little farther culture. Let it be well turned up by a plow that will cut deep, and then harrowed over. After this let the seed be sown by the broad cast-way, in the quantity before-mentioned, and then let a roller be drawn over the ground, to press it in.

The land in such a place is of little price, and there will undoubtedly be a crop. Its uses are the same with those of the common spurrey: and if it do but equal that there will be advantage in the attempt: but he may be assured it will very considerably exceed it. This is one of those trials we have to propose to the industrious and spirited farmer, and like all the rest, it may be attended with considerable good, but can do him very little harm.

End of the SEVENTH BOOK.

# A COMPLEAT BODY OF HUSBANDRY.

BOOK VIII.

*Of such roots as may be advantageously planted in fields.*

IN ELEVEN CHAPTERS.

CHAP.

CHAP.

- |                                                                                      |                                                                     |
|--------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| 1. Of the soil for turneps,<br>and manner of sowing them<br>in the common husbandry. | 4. Of certain particular ways<br>of raising a crop of turneps.      |
| 2. Of managing turneps in the<br>ground.                                             | 5. Of the potatoe.                                                  |
| 3. Of the uses of turneps.                                                           | 6. Of the soil for potatoes, and<br>the manner of planting<br>them. |
|                                                                                      | 7. Of                                                               |



## CHAP.

7. *Of the preserving of potatoes.*8. *Of carrots.*9. *Of the soil for carrots, and*

## CHAP.

*its preparation.*10. *Of sowing of carrots.*11. *Of managing a crop of carrots, and their use.*

## The INTRODUCTION.

**W**E have observed in the preceding part of our work, that the gardener and farmer are intrrenching upon one another's province; the gardener planting his proper crops in the field, and the husbandman often employing himself about the products generally supposed to belong to the garden. This is no where so much the case, as in the present subject.

We are in this book to treat of roots which the farmer may advantageously cultivate in fields; but which have been originally, and are in general still at this time, the products of the garden. These he will find easier to manage than many of his more usual crops. A field is a great garden; and the main difference lies in the degree of culture. For many of the common products of the garden the well managed labours of the field will answer; and if he add more expence, and a different manner of working, he will find it well answered by the increase and value of the production.

Many roots may be cultivated in fields: but there are three principal species, the turnep, potatoe, and carrot. The demand for these is continual, and they bring a very great profit.

After these are to be named some other roots, propagated at present only abroad, or confined to one or two spots of this kingdom: these we shall separate from the present, treating of them in a succeeding book, together with those other products, which are in every husbandman's power to cultivate to advantage, though they are not yet well established among us.

Of the three roots we have to treat of here, we have spoken of the first already, so far as the drill and horsehoeing husbandry are concerned in its culture; to avoid repetition, we refer to that head for many particulars relating to turneps as raised by that method; and shall here treat of that root only as propagated in the field by the common husbandry, by which it may equal that of the garden.

## CHAP. I.

*Of the soil for turneps in the common husbandry, and manner of sowing them.*

**A** Poorer soil will do for turneps in the horsehoeing husbandry, but in the common way we advise the farmer to look



upon them as a garden root, and give them what is as near a garden soil as his fields will afford. In the new practice fresh supplies of nourishment may be given them, by dressing the ground while they are on it; but in the common way nothing essential can be done to that purpose: the turneps are to trust to such nourishment as is in the ground when their seed is committed to it; therefore the richer it is at that time the better.

A good black mellow earth, with some small admixture of sand, or a very rich loam with a great quantity of mellow earth among it, are the most favourable soils for the field turnep. We would have our farmer raise them to equal those of the garden, and there is no way but by a good choice of the soil. It must be light and warm, to prevent the destruction of the crop; and we must add the other quality of richness, in order to the roots being well nourished.

Turneps stand a great deal closer this way, than in the drill and horsehoeing method, and therefore there must be more nourishment in the land that is to supply them. A soil too sandy is never very rich, this is the material objection to that kind, which otherwise, from its lightness and warmth, would be proper; clays, being heavy and cold, are the worst of all soils for turneps.

The quantity of seed we have mentioned before, and shall add here, that there is a nicety in covering it which few regard. Errors in this are the cause of half the miscarriages that happen to turnep crops. This seed requires to be tolerably well covered, and to have the earth pressed close about it. From the want of this I have seen crops come up poorly on good grounds, and half of them decay afterwards, while the remainder came to little or nothing.

There is no danger of squeezing the earth too firmly about them; for we have seen very fine crops by sowing in a barley field just before mowing. In this case the ground must be every where squeezed, by the treading and carrying off the corn; but this, far from hurting the seed, has sent it properly into the ground, and the stalks of the barley sheltering it, have done service.

The harrow tears up the ground too much, and buries the seed too deep; the best way is, when it is scattered properly upon the field, to draw a bush harrow over the ground, and then to go over it with a very heavy roller. There is another method that may be used for sowing of turnips, which is, to have a wooden roller stuck full of short pegs, then drawing it over the ground the seed is to be scattered in, and a bush harrow is to be drawn over it afterwards, which will sufficiently level the ground.

This



This pressing down the earth about the seeds, is of excellent use in many other kinds ; we see something like it practised in gardening : they tread the seeds in first, and then lightly rake the earth over. A good roller would answer the purpose of treading, and harrows with short sharp tines, as rakes. This would bring the garden method of working into the field.

The danger of the fly may be, in some measure, obviated by steeping of the seed. There is an excellent receipt among the farmers for this purpose. Mix equal quantities of stone, lime, and wood soot. Have ready a quantity of urine, sufficient to moisten them into a thin pap. Heat a little of the urine and put to the rest, that it may be all milk-warm, then mix it by degrees with the lime and soot. The lime will presently flake, and the whole will make a smooth mass : pour this when cold upon the turnip seed, let it remain four and twenty hours, and then sow it in the manner we have directed.

#### C H A P. II.

##### *Of managing turneps in the ground.*

**W**A T C H the growing shoots while very young, to see whether they be taken by the fly. It is impossible to guard perfectly against this accident, but it is proper to be upon the watch, to know it as soon as possible, for it should be repaired by another crop.

This danger is only while the turnep is in its seed leaf : these insects do not regard it afterwards. The taste of those ingredients will, in some degree, hang about the seed leaves, so that they will be more likely to escape. But the farmer must not trust to it entirely.

The danger is being starved by weeds. Several kinds grow among turnips ; but there is one particularly mischievous, this is charlock, it resembles the turnep so much in the leaf, and manner of growing, that it may rise in great quantities unnoticed ; nor is it always safe to order it to be weeded out, for there have been instances of the weeders taking up a whole crop of turneps, and leaving all the charlock ; this being a time when the turnep has not any thing of a root, whereby it should be distinguished. The right weeders at this season are sheep, they will distinguish where the labourer cannot, and what is very singular, they will, in this period of the growth, prefer the weed to the crop.

If a turnep field be over-run with this destructive weed, let him turn in a competent number of sheep ; and they will eat off all the charlock, which will never rise to any height again, and will leave the turneps untouched. This might seem a des-



perate undertaking, but there is no arguing against experience, and this method that has stood the test of ages. Too many sheep must not be turned in : a moderate number will be sufficient for the purpose, and more might damage the crop which they did not devour.

The charlock being removed, the distance of the plants is to be considered ; and as they generally rise too thick from this random sowing, they are to be brought to proper distances by the hand hoe. This clears off the weeds, and the turneps are left at a proper distance, and with a clear ground fresh broken for their nourishment. This hoeing is all the farmer can, in the common method of husbandry, do for his crop ; therefore he is afterwards to wait their growth, as nature brings them to perfection.

The first use of the turneps is to feed cattle under cover. For this purpose a proper quantity are daily to be pulled up, and carried home in carts. The farmer's people usually begin at one corner of the field, and clearing all off, go on ; so that by degrees a good part of the field has been left bare, while the crop was growing on the other. The farmer has an opportunity of bringing his field into better condition every day, and for want of a little thought it is utterly neglected.

Turneps raised by the drill and horsehoeing husbandry, are larger than those in the common method : and this is in a great measure owing to their distance. Turneps in the common way of culture, are starved by standing too close ; and here is an opportunity of thinning them. When some are to be pulled for feeding in the house, the trouble will be little more to gather them in different parts of the field ; and the benefit will be very great.

Let the persons who pull the turneps, draw them in such manner as to thin the rest of the crop regularly. The very pulling of them up will break the ground a little, and every thing of this kind is an advantage : the turneps left in the field will stand thus at greater distances, wherefore they will grow to a larger size ; so that they will make amends by their encrease in bulk, for all that are taken up ; and the crop shall be in reality not diminished in quantity, but only in number.

### C H A P. III.

#### *Of the uses of the turneps.*

**T**HE table use of the turnep will always make a demand for them, and this will be proportioned to the farmer's situation, near or remote from a market. He may, on these occasions, send



send a parcel of his best turneps, according to the demand, and they will make a handsome addition to his profits.

If he live in the neighbourhood of a great town, it may be worth his while to keep his crop for that purpose, making only such a reserve of the worst part, as may be just needful for his cattle. He will thus be a gardener, only in a larger way. We are next to enquire into the best manner of giving turneps to cattle.

It was thought at one time a great piece of husbandry, to chop turneps before they were given to cattle; but this has been found to have bad consequences, and is now omitted. This tempted the creatures to eat them without chewing, so that they had not half their nourishment, and sometimes they were choaked with the hurry of swallowing them. The proper method is to give them whole, and it is more profitable to pull them, than to turn the cattle into the field. They eat more entirely what are given them, so that there is no waste: and they fatten much sooner when kept up, than when they ramble about.

The only inconvenience in fattening of cattle with turneps is, that it will give a flavour to their flesh: but this is remedied, by feeding them ten days at last with hay.

Wood ashes are destructive of the fly that destroys the young turnep: it is a good method to scatter some thinly over the crop, just after the plants are above ground: it will often preserve them; and is so far from doing harm, that it will always promote the growth.

After this fly, the greatest enemy is the caterpillar. It is a particular species that seizes upon the turnep leaf, and this only devours it while young. It is a small black kind; and will be found very plainly when it is in sufficient number to do mischief, for it can do this no otherwise than by the multitude, like the fly. When these are seen the weather is to be consulted: in a dry season they may be destroyed at once by proper rolling, but in wet weather that instrument must not be brought upon the ground. If the condition of the land, and of the air, permit, let a roller be drawn carefully over the whole field, very early in a morning. The caterpillars will at that time be out on their food, and their bodies being tender, the roller pressing heavily, and the dry earth making some resistance, they will be utterly destroyed. This pressure of the roller, far from injuring the turneps, will make them root the better.

The naked snail, or slug, is also troublesome on these occasions. If it be at a proper time of the growth, the roller used in the same manner, will destroy that also; but if the turneps



are at such a growth that the roller cannot be taken on, the method is to turn in some ducks, they are fond of slugs: they will do no harm to the turneps; and their dung will help the ground.

#### CHAP. IV.

*Of particular ways of raising a crop of turneps.*

**T**HERE may be a very good crop of turneps obtained by sowing upon the stubble, as soon as the corn is off. The seed is only to be harrowed in, and the crop reserved till late in the spring, for the food of ewes and lambs. If the land be intended for fallow, in the open field countries, they may very well stand till April, which will make a supply for sheep, when provisions are most scarce. A great deal of the success of this crop depends upon the season: if the winter be very severe it often comes to nothing; if mild it seldom fails, and in the other case the loss is trifling.

Another method is to sow turnep seed pretty thick among a crop of hog pease, just when they are ready to cut. No more care need to be taken in this case, beside the scattering the seed in proper quantity among the pea stalks: but this quantity must be larger than is commonly allowed, because some will be lost. The reapers are then to be sent in, and no particular orders need be given them concerning the new crop. Let them cut and carry off the pease in the usual way, and the treading of the people's feet will crush the seed of the turneps into the ground, and press it down a little, which is assistant to the growth of this species.

When the pease are off, and the ground has been a little at rest, the turneps will shoot up, and they will be in less danger of insects at this decline of the year, than they would have been in the wet and warm part of spring; if any appear the same methods may be used to destroy them, and, one way or other, the farmer has a fair chance for a good winter crop. When the turneps are at some little height they will require to be hoed by hand to thin them, and to break the ground about them. The weeds are destroyed also; but this is a lesser consideration, for at this season they are fewer than in spring.

The necessity of thinning the crop is greater in this way of raising them than in any other, because they rise more irregularly; and when they are very thick in some parts, and other spots are entirely vacant, they should be taken up and transplanted. The earth being trod very much, and not broken up, requires this hoeing also, for otherwise it will be too hard. It answers the purpose of the seeds, because the pease have made it mellow.

Ano-



Another very useful way of raising a winter crop of turneps, is upon a piece of ground where there have been beans. In this case the method is to plow up the land once, and then harrow in the turnep seed. Either after beans, or a crop of any kind of corn where it has grown thick, the ground is so hollow, that once plowing does very well to prepare it for turneps; and by any of these methods, if the winter prove tolerably mild, there will be a profitable crop, but otherwise late sown turneps frequently suffer.

C H A P. V.

*Of the potatoe.*

**T**H E potatoe may very properly be cultivated in fields. It is fitter for the great extent and plain fashion of a field, than for the narrow compass and divided beds of a garden. 'Tis but lately our people have informed ourselves properly of its culture; and the more we know of that, the more reason we see to banish it the garden. It is hardy enough to bear the exposure, and it requires no great charge in the culture: why then should we limit it to the garden? every particular speaks for its being giving into the hands of the farmer, especially when near large towns, though every where there will be a great demand. We shall therefore lay down such a method for their management, that he cannot fail to meet with success.

The potatoe is a plant of a singular manner of growth: writers refer it to the nightshade kind, calling it nightshade with the tuberous eatable root.

The root is composed of several large roundish lumps, joined to one another by strings, and spreading a great way in every direction. The stalks are numerous, three foot high, branched, and full of leaves. These are divided into several parts, but the division or disposition is irregular. The flowers are large, and either of a dusky purplish hue, or white, the fruit is a large berry.

We had this plant originally from North America. It is in a manner the food of the common people of Ireland; and is cultivated in Lancashire, and some other parts of England, in vast quantities. Our intent is to make it more universal.

C H A P. VI.

*Of the soil for potatoes, and the manner of planting them.*

**M**O R E depends upon the chusing a proper soil for potatoes, than almost any other root. It is hardy, and will live any where, but it will not spread and propagate unless the soil suits.

There



There are few soils that will answer, in the right manner, but those that do yield a prodigious encrease. The first quality the soil must have is freedom and openness, the second is richness, and the third a due moisture. The best soil of all is a mellow earth, or good fine mould, in the condition wherein we most frequently see it, which is light, deep, and with some moisture; this points out a part of the kingdom for the propagation of potatoes, where they are very little regarded at present, the northern edge of Northamptonshire, and the adjacent country. They have there this soil in great perfection, it is in some places too wet, but there it would not answer: the place is where the moisture is moderate.

After mellow earth, the soil most favourable is a rich loam: if it be of the richest kind it is to be mended by dung.

Clay is to be shunned, because it will not suffer the roots to spread; and gravel, because it will not supply them with nourishment. Chalky soils are improper for the same reason as gravel; as to the sandy, they fall under the fault of poorness, but they are open and free for the spreading of the roots; and on some grounds of this kind, that have not been too absolute sand, improved a little with manure, I have seen very good potatoes.

The red potatoe succeeds best upon the sandy soil: but it never equals that on the rich loam, much less that on the mellow earth. The different effects of the soils we have named are these, the clay will not let the roots spread; and the sandy, though they give room, will not feed them sufficiently; the light mellow earth produces the largest and the most numerous roots.

There may be an easier improvement made in the sandy soil, than on any other. Laying on a proper manure will bring it into a good condition: the best is rotten dung and the mud of ponds.

This being a kind of garden root, let the ground be well prepared. Let it be plowed in a careful manner, considerably deep.

Let there be trenches cut across six inches deep, and a foot asunder; in these the farmer is to lay regularly, the smallest roots of potatoes he can get, with a particular care that they be fresh. They must be placed six inches from one another, and covered up by harrowing the ground all over.

This is to be done in the latter end of February.

When weeds are risen to such a height that they can be distinguished from the shoots of the potatoe, hoers are to be sent in to cut them down; and in doing this they will break and divide



divide the surface of the ground so, that the rains and dews will get in, and the crop will thrive upon it immediately.

When the weeds have again got up to a height, the hoers are to go in a second time and clear all away.

After this the stalks of the potatoe will not be so high and strong, that they will suffer no more weeds to grow among them.

This is all the culture the potatoe requires, and nothing can be more easy. Here is no particular expence in preparing the ground, no great charge of stock and labour; and there is no hazard of success. The sale is certain, and the profit very great. One summer brings the crop to perfection.

# CHAP. VII.

## *Of preserving potatoes.*

**O**UR crop has been put into the ground in the end of February, and requires no more time for its encrease than to the latter end of September. The potatoe should always be taken out of the earth, before frosts can hurt it.

Begin with that part of the field that lies most exposed: and continue taking them up once in two or three days, as there is a demand. When the ground is affected to any depth by the frost, get up all the remainder.

Provide a place where to put them: a cellar, with a good quantity of sand, will answer this purpose; taking out what he has a demand for, as he wants them, and reserving the smallest, for planting in the spring.

The produce will be greater than those can believe, who are not accustomed to such things: it will depend upon in some measure the soil; the difference is so great, that the expence of breaking the land by tillage, and enriching it by manure, will be very amply returned. The size as well as number depending on these articles.

Ten large potatoes is but a moderate produce, from each small root that was planted in spring: when the ground is more favourable, thirteen or fourteen handsome ones; and on counting, with the best possible exactness, in a field of Mr. Ryder's near Thorpe, where every needful caution had been taken, we computed this year, 1746. that there were in general eighteen large and fine potatoes for every small root that was planted. This, for a seven month's encrease, is very great; but nature has in all things provided, that what is most useful is most abundant.

The decay of the stalks will not fail to give the farmer notice to take up the roots. About the middle of September  
the



the plant entirely ripens, and after that it quickly fades. The first frosts attack the stalk and leaves. When the farmer sees the leaves yellow, and the berries of a dead ripe colour and dropping, let him begin to take up at that time, and continue till all are out of the ground.

It has been proposed by some, to cut off the tops of the potatoe as soon as they grow poor, in order to preserve the root from frosts. I have seen this tried, and it is fit I warn the farmer from such a project. It let in the frost to the roots much sooner and more powerfully than it otherwise would have been, and the consequence was the loss of great part of a very good crop of roots.

The advantage of the potatoe remaining as long in the ground as may be, is that it all the time is increasing in bigness, and encrease in bigness is encrease in value.

Some have ventured their potatoes in the ground all winter, covering them with fern and other such matters, beside their own straw; but this is hazardous, and of no use. The potatoes may be preserved, but they will not grow in the least. The nature of the field must determine the farmer who is inclined to this expedient, whether he shall venture upon it or no. The more wet there is the greater the danger: sandy soils therefore are fittest for this purpose. A field may be so situated, and of such a soil, that the ground may serve as sand, and the enclosure keep it as warm as a cellar; but there is no advantage, though there may be little hazard; some sand in a cellar keeps them more securely, and they will no more grow in the field than there.

At the time of taking the potatoes up, the farmer must send into the ground a man or more, and to every man one or two women, or children; the man must have a strong three tined pitch fork, with which he is to dig out the potatoes, and the women and children are to follow him; picking them up, and carrying them to heaps that they may be conveniently taken off the ground together.

When they are got home they must be cleaned, and lightly washed, and after this dried two or three days in the sun: they will then be fit for market or for keeping.

Potatoes, when the quantity is very large, may be preserved during the winter, in a pit made in the ground, but this must be done with great care. The farmer must see for a dry place, where the soil is warm, and there is good shelter. He must dig his pit in form of a ditch, three foot wide, and five foot deep, and line it on the sides and bottom with dry wheat straw. The potatoes are to be carefully put in till the ditch  
be



be full up to the level of the ground ; a quantity of straw is then to be put over them, and on this is to be raised a ridge of very dry earth. In this manner they will keep through winter, and be ready on all occasions.

Where the ground is a perfectly dry sand or gravel underneath, the potatoes may be kept very well in pits, dug for that purpose ; and thus they are preserved for the supply of the London markets, in those parts of Essex and other counties where they raise most for that purpose.

For the sake of the farmer who shall have large concerns in this article, I shall give some hints respecting a particular kind of the potatoe, which though less observed than it deserves, has advantages quite separate from the others.

We distinguish potatoes into two kinds, white and red ; but we may very well add a third, under the name of the yellow.

Whoever is accustomed to deal largely in this root, must have observed that there is a yellow kind, which is usually very large and thin skinned. This is kept separate by the Irish, who are more used to this root, and prefer it to both the others. Its size is not the only difference, or the only advantage.

The great danger in potatoes, is the losing them by frosts : the reason is their shallow rooting. The yellow potatoe roots deep : the several new roots are generally lower in the ground, than the first was planted ; and they will be safe when the others are destroyed. In Ireland they never take them out of the ground in winter, but as they want them, in many places, but it is because they propagate this yellow kind ; for the others would be destroyed there, as well as here.

This kind is in Ireland called the Munster potatoe. It will last in the ground a great many years : but though the practice in Ireland, and in Lancashire in some degree, authorizes this method, I shall advise the farmer against it : I have always seen this root flourish best in a new plantation, and shall advise to clear, and new till the ground at least once in three years, that he may have its full advantage. I shall also advise him against the common practice in some places of planting pieces of potatoes, instead of whole roots ; it is true that pieces with any eye to them will grow, but whole roots always succeed better.

## CHAP. VIII.

### *Of carrots.*

**T**HE carrot is a root as fit for the field as the garden ; requiring very little culture, and producing a great profit. It is hardy enough to stand the cold, and other natural accidents :



dents : and though in some parts of the kingdom, only hitherto it is kept in fields, is very worthy to be introduced every where, and is indeed, for many reasons, fitter for the field than the garden. The root is long and thick, varying in colour from the deepest orange to the palest straw. The leaves are divided into a multitude of minute parts. The stalk, when the carrot gets to flowering, rises in the midst of the leaves, and is four foot high. The leaves stand irregularly on it, and are like those at the root, only smaller and paler. The flowers are little and white, they stand in a large rounded hollow tuft at the tops of the branches, and are followed by seeds that are numerous, small, pale coloured, light, and rough.

There is a variety of colour in the roots of the carrot, the gardeners have hence made what they call three principal kinds. These they call, 1. The dark red carrot. 2. The orange carrot. And, 3. The white carrot. The first and last of these terms are somewhat improper, the first kind being only a very deep orange, and the other a very pale yellow. The first is the most esteemed. The white kind is more common in France and Italy than here ; and is the sweetest and finest flavoured of them all. The farmer is to cultivate not that which is best, but what people think so ; and therefore he is to chuse the deep red, commonly called the Sandwich carrot.

#### CHAP. IX.

*Of the soil for carrots, and its preparation.*

**T**HE first thing must be to examine whether he have proper ground. Those plants whose profitable part is the leaf or ear, may be raised on different soils, by the assistance of manure ; but these which depend on the root can never come to any thing, when the ground is not proper in its own nature.

Three things are requisite in land for carrots. It must be deep, rich, and dry. These do not often concur. Deep and dry is common, because all sandy soils have it ; and therefore in general they are fit for carrots ; but to be rich withal is the compleating of the business. The other will give room to penetrate and warmth to cherish, but when nourishment in abundance is joined with these, in the richness of the land, 'tis then the ground is compleatly proper.

For this reason a fine rich deep garden mould, where there is not too much moisture, is very proper for them ; but too much moisture is the common fault of this kind of ground. To speak from experience, the very best soil for carrots is a rich loam : that is, a dry earth, in which is a great deal of sand, a good quantity of mellow mould, and a very little portion of clay.



clay. Some clay there is in all loams, but the less the better on this occasion; I have seen excellent land for carrots in Northamptonshire and Lincolnshire, upon those rising grounds adjoining to the fens, and just raised above them. And in Surrey and Sussex there are vast tracts left in a manner desert, which would yield great profit from carrots. In these instances we see the vast advantages that would arise from making the knowledge of husbandry universal; the putting into the thoughts of farmers in one place, what is the profitable practice of another on like soils. We hope this work will be instrumental to that purpose.

The soil being chosen, the preparation consists in two articles, enriching it by manure, and the breaking it deep by tillage. All land will answer the better, the more care is taken of it in this respect: we shall shew the manner of doing it; for otherwise all the expence may be worse for the crop, than if the land had been left in its natural condition.

The plowing and dividing of the land, should be done just before the seed is sown; but the manure should be laid on a year before. This will occasion no loss of time with the judicious farmer, for he may have a vast crop of some slight rooting plant, as the small pulses which will mellow the ground by shading it with their stalks, at the same time that they yield him a great encrease, without exhausting the effect of the manure. After this the land being plowed up for carrots, will be in the best condition to support them.

The reason of this management is plain: the carrots will have great advantage from the richness it gives the ground, for the richer that is the larger they will be; but fresh dung subjects the land to worms; and this should be feared more than any other accident, in a carrot plantation. These roots are a luscious food for those insects; and when worm-eaten they are worth little.

The ground requires to be open'd very deep for carrots, because their whole value is their length and straitness, which they will never attain if they have not a free passage. For this reason the old practice was to dig the ground with spades, the carrots requiring it to be well broken two spit deep, and no plow then in use answering this purpose.

This was bringing gardening into the field; but that is not what we mean by recommending to the husbandman the culture of garden roots. If they can only be propagated in fields at the same charge as in gardens, there will be little profit to him, and it is only leading him out of his way; we should not have named the carrot, had we not intended to put him in a way



way of propagating it with the proper implements of his profession.

The four coultered plow will perfectly answer the purpose of the spade ; and this reduces the whole expence, and throws the article directly in the way of the farmer. This plow cuts full two spit deep, so that it perfectly answers the purpose of digging by hand ; and by the means of its numerous coulters, it cuts, divides, and breaks the whole substance of the soil, better than the spade.

## C H A P. X.

### *Of sowing of carrots.*

**T**H E first care is to procure good seed : this he will know by its sweet smell, its pale colour, and its roughness.

The seed being chosen, he is to get to work upon his ground in the beginning of March. Gardeners sow carrots the year round, that they may have crops one under another ; but the farmer sows them for two considerations, to have large roots for market, and to get good seed from proper parts of his ground, which is abundantly produced, and yields a large price.

The beginning of March is the time when he is to prepare by plowing ; and he must have a couple of women or boys to follow the plow, to pick up any loose stone or other hard matter that may chance to be turned up.

When the ground is thus deeply cut up and picked, the harrows are to be sent in, and the surface is to be well levelled like the best prepared border in a garden : this done it is ready for the sowing. When the seed is a material consideration the plants are to be kept farther distant, and the driest and warmest soils are best.

There must be a great deal of care in sowing carrot seed : a proper day must be chosen, otherwise it will be impossible to do it well. The weather must be calm, and the person who sows must go over all the ground carefully, with the seeds in his apron, and must spread them by hand a few at a time. He must take care they fall separate ; for their rough surfaces make them very apt to hang together. When they cling to one another, he must rub them in his hands, and thoroughly separate them. His next care is to see that they fall regularly. As to the manner of their lying ; one about every three inches is the best method : not that the carrots are to stand so close, but there should be seeds enough sown that accidents may be allowed for, and the plants thinned by hoeing.

As



As soon as the seed is upon the ground, let a heavy roller be brought on. This settles the seeds in their places.

This done, a fine and short toothed harrow should be drawn lightly over, and then the article of sowing is finished. In these well prepared lands, the harrow does not bury the seed as it will where there are great clods: the rolling and harrowing answers to the treading in, and raking of the seed in the common practice of gardening; and they shoot up as regularly this way as the other.

## C H A P. XI.

*Of managing a crop of carrots, and their use.*

**A**S soon as the plants are got to some little height, hand hoers are to be sent into the field. They must cut up all weeds, and thin the plants. The proper distance at which they should be left, is seven inches: and thus they are to stand till they come to perfection. The ground having been once well weeded in this manner, the carrots will grow so vigorously, that their leaves meeting, will overspread the whole, and let no weeds grow between them.

The carrots will grow to a good size by the end of autumn, and they will thrive the better if quantities are pulled for market, from time to time, when they are big enough to be saleable; not drawing these all in one place, but from those clusters where they happen to stand thickest.

Toward the end of November the leaves will begin to decay. The farmer will know this by their becoming yellowish; and it is his notice for taking up the roots. The carrot should be taken up in the beginning of winter, and laid by in dry sand, to be kept ready for the market.

Frost always hurts carrots, therefore, as soon as that time of the year approaches, when they are to be exposed to the hazard, they must be taken out of the ground and laid up in sand: and this must be in a dry place.

This is the management of the carrot; it is easy and familiar in the greatest degree; and the profit is great and certain: there is always a market for this root, and the price is such that the profit proportioned to the land and labour is very great.

The root is not the only article by which it is serviceable to the farmer, for a great deal of profit is made from the seed. This is the produce of the second year, and for this purpose the plants may be either left in the ground during the winter, or the roots set in again in the beginning of spring.

The gardeners use the latter method, but the farmer will find the other best, because there is less trouble; only he must take



care that he chuse the driest and warmest part of the field for that purpose.

If the carrots for seed are planted, after being kept in sand during the winter, the largest and finest roots must be chosen: in the other method, the most vigorous plants must be left. These are to be kept at a due distance, about a foot asunder. In this condition they will gather strength during winter, the stalks will rise early the ensuing summer; and the seeds will ripen about the middle of August.

When they are thoroughly ripe the plants are to be cut down with an hook, and laid in the sun and air four days to dry, frequently turning them. After this the seeds are to be beaten out of them; and when separate they are to be aired and dried several days before they are put up for sale; they will thus be perfectly fine, sweet, and well coloured, and will bring a large price.

End of the EIGHTH BOOK.

A  
C O M P L E A T B O D Y  
O F  
H U S B A N D R Y.

B O O K IX.

*Of several advantageous articles in husbandry, which are less universal than the others.*

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1. Of hops.
2. Of the several kinds of hops.
3. Of the proper land for a hop ground.
4. Of placing the hills.
5. Of planting the hops.
6. Of dressing and managing a hop ground.

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7. Of polling the hops.
8. Of inspecting the polling and growth.
9. Of tying the hops.
10. Of clearing the ground, and raising the hills.
11. Of shortening the plants.
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13. Of



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13. Of the drying of hops.
14. Of drying hops in the Flemish manner.
15. Of drying hops in a malt-kiln.
16. Of drying hops in a kiln prepared for that purpose.
17. Of bagging of hops.
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23. Of the different kinds of flax, and the choice of the seed.
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38. Of the management of the hurds.
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100. Of sowing of beans.

## The INTRODUCTION.

**T**HE title we prefix to the present part of our undertaking, shews the sense we entertain of its importance: 'tis the misfortune of the husbandman, when any thing really advantageous, is not universally known. We shall recount several kinds of crops under this head, that deserve to be made common throughout the kingdom; and shall lay down such rules for their management, that those who try carefully cannot miss of success. We shall begin with one species, the value of which is sufficiently known, in those parts where it is commonly raised: this is the hop: and this, as it may be cultivated



tivated to the great benefit of the farmer, in many others, we shall hope to render more general.

CHAP. I.

*Of hops.*

**T**HERE are few things by which the husbandman may enrich himself more than hops; but there requires a knowledge of their nature, the ground they suit, and the accidents to which they are liable, in order to his entering upon the design with a rational prospect of success. Their management in the planting, growth, and gathering, is also a peculiar branch of the business. This is at present confined to a few counties, but there are many other places where it will succeed as well.

The hop is a tall weak plant: naturally it runs up hedges; and art supplies it with poles for this purpose. The root consists of thick black strings: the first shoots are soft, and tender, like those of asparagus, and are eaten in the same manner. The stalks, as they rise higher, become rough and firm in their substance. The leaves are large and rough, and are divided like those of the vine.

It does not appear that the antients were acquainted with the hop. Pliny is the first who names it, and that only as a salad herb. We are not to wonder we read nothing of it before his time. The Greeks studied utility; and the use of the hop in malt liquors, which is its great service at this time, was not known to them. They had malt drinks, but they were not made for keeping. *Lupulus* is the name by which the hop is called by Pliny, and others; but it is become a fashion lately, to call it *Humulus*.

CHAP. II.

*Of the several kinds of hops.*

**T**O speak with strictness there is but one kind of hop; for what are mentioned under different names, are only varieties of the same plant, as culture and other accidents have changed it. However, as some of these keep their difference in planting, we who write for utility, not curiosity, may very well distinguish them according to the custom of others, into these several sorts.

The planters tell us there are four kinds of hops: 1. The wild garlick hop. 2. The long and square garlick. 3. The long white. 4. The oval. The first of these is what authors call the wild hop, the three others they confound together under the name of cultivated hops. The wild kind is poor, small,



small, and not worth notice. The long and square garlick is a well tasted hop: but 'tis ill-coloured, for which reason it does not bring so good a price. The fault in this respect is a redness about the stalk. The long-white is the most beautiful hop; and the most valuable, because of its greater encrease, and the next to these are the oval; these are shorter than the long-white, but otherwise equal in colour and flavour. It would be natural to say none but the long-white should be cultivated, because these are the best and most plentiful, but 'tis not every land that will bear them. They will live in any, but to thrive they require what is very good; and a thriving crop of the long and square garlick, is better than a starved one of the other.

Let the husbandman suit the kind to his land. All hops love a mellow rich soil, but the long garlick being most of the nature of the wild hop, will bear a somewhat poorer ground better than the others. The proper soil for a hop ground is a rich garden mould. But as this is never found entire, we are to tell the farmer that of its two general mixtures, which are sand and clay, the clay makes it unfit for hops; but the sand, in a moderate quantity, is not hurtful.

In order to plant hops with any prospect of success, the soil must be deep and well conditioned to the bottom. If the ground be a pure and fine mould, let him plant the long-white, and no other kind. If it have a moderate mixture of sand, let him plant the long-white and oval together, for they will do very well in the same ground. If it be much inclined to clay he is not to use it for this purpose: but if only somewhat clayey, and he will have it a hop ground, he must plant the long garlick. Before he fixes upon his design, let him not only examine the condition and depth of the earth, but what is under it. The deepest soil does not reach far, and in all growths a great deal depends upon the nature of the bottom. A clay bottom is too cold, and retains too much wet; and a gravelly bottom lets it through too fast, so that they have not enough to nourish them, for the hop being a tall plant requires a good quantity of moisture. A loamy bottom is the best. That sort of earth of which bricks are made, is of a very fit kind, and is a common bottom to the soil in most places. Let the upper coat or soil be light and rich, and it matters not for the colour. The Essex hop grounds are on a moory land, which is black; and many of the Kentish are upon a whitish crumbly soil, they succeed equally well, all that is required being a quantity of good ground, wherein the roots can run with ease, and find a due share of nourishment.



## C H A P. III.

*Of the proper land for a hop ground.*

**P**LANTS in general send their roots deeper and farther in search of nourishment, than is commonly thought: none more than hops. For this reason, in preparing land for them, if the upper part be a great deal better than what is under it, the work must be done in the way of trenching, and the fine part of the soil buried undermost. When the ground is over moist, it must be laid up in high ridges, to be well drained. And when it has been thus managed at first, it must be kept in the same condition, by keeping the drains open and clear. Clayey soils are to be avoided, and there are two others nearly as bad; these are, the gravelly and rocky. In neither of these hops will ever answer; but in any others they may be raised; and if the worser kinds be planted on the more indifferent lands, and the finer reserved for the best, with due care they will never fail.

Hops exhaust a land extreamly. They may be planted after almost any other growth, but no other will thrive after them except trees, which root deeper, and spread farther than they.

When the farmer has laid his design for a hop ground, let him plant it at the same time with apple and cherry trees. These draw little nourishment while young: therefore the hops will very well stand twelve years with advantage. At the end of that period the right practice is to make a new hop ground in another place. By this time the cherry trees will bear. They will continue improving every year for some time, and will last very well five and twenty years; at the end of this time they may be cut down, and the apple trees will be then in fine order.

## C H A P. IV.

*Of placing the hills.*

**W**HEN the ground is fixed upon, and a quantity of plants are in readiness to be taken up occasionally for it, the ground is to be prepared for their reception. Hops are planted on little hills, and these are to be placed at such distances as are best suited to the extent of the ground, and the intended manner of dressing.

If the piece be small, the breast plow or spade must be used for dressing the ground, when the hops are upon it: but it is much better to set out with a larger piece, and dispose the plantation for horsehoeing. Whichever method is taken, time and pains are required to put the ground in proper order. October



is the season for planting the hops, but the preparing the ground is the business of a month before. The first thing that must be done is plowing it up, and laying it very even. The spade may answer this purpose in a small piece of ground, but larger are in all respects better. The intent is to break the ground very small, to a considerable depth. The proper plow is the four coultered one, set to its greatest pitch. In this condition, with the guidance of a skilful plowman, it will cut two spit deep, and tear the ground all to pieces the whole way. When the ground is broke by this plow, let a harrow be drawn over it; and last of all a light roller. It will then have an even surface: and this is the condition wherein it is fit for laying out for the designed plantation.

The next thing is to determine the distance of the hills, and when this is settled a long line is to be procured, and a knot is to be tied in it by measure, at every distance that is settled for a hill. The form must be determined by the ground; if that be small, and the spade or breast plow are to be used, then the best method is the quincunx, which disposes the hills in lines, and leaves regular alleys every way between them, but in larger grounds 'tis best in squares. The line is to be drawn strait across the ground, from place to place, according to the determined distance, and a stick is to be fixed down at every knot. This marks the placing of the hills.

When the soils is thus turned and mixed together, the planter will be better able to judge of it than before. If it want richness, let him add some good manure to the places which are marked for the hills. It is rarely that a piece of ground is so perfectly good, as not to admit of this improvement, and as it is very great, and of no vast expence or difficulty, 'tis always worth while to do it. We shall therefore advise the husbandman in general, to plant his hops in a compost. The best method of making it is this. Dig a quantity of rich fine earth, proportioned to the number of hills; add to this one fourth part the quantity of very old and well rotted dung, and about a tenth part of sharp sand, let this be well mixed and stand in readiness. Then at every stick open a hole two foot deep, and a foot and half square, fill this with the compost, and all is ready for the plantation. The distance of the hills is one of the nicest things in the whole business. Neither can any general rule be given about it: for the nature of the soil, and extent of the ground, and intended manner of working, will make variations. Eight foot distance is a medium. If the soil be worse than ordinary, he may make his hills at seven foot distance, and if it be very rich and fine to set them at nine foot.

If



If it be at any time found either in a new ground or an old one, that it will nourish more hops than there are upon it, the best way is to add to the number of plants upon each hill, and not to multiply the hills. So that the planter need not be afraid he shall place them too distant.

## C H A P. V.

*Of planting the hops.*

**T**H E hills being prepared, are to be planted; and care must be taken in the providing such sets as are excellent in their kind. Let the husbandman trust no eye but his own for the choice, and let him observe the following cautions. Let him consider the soil from whence he has them; here there are two essential points, which in a manner contradict one another. 'Tis necessary he should have the strongest and most flourishing sets he can procure, and 'tis best that he have them from a poorer ground than his own. Let him be sure they do not come from a richer soil, for then they will certainly dwindle. Let him chuse the strongest shoots of a middling piece of ground; for his compost into which they are to be set will certainly exceed that in richness, so that they will be forwarded for the first shoot; and the whole ground being newly stirred, they will spread their roots without difficulty, when they have shot them beyond its extent. When the planter goes into a ground for purchasing his sets, let him examine the height of the hills. Nothing so strengthens the shoot of the hop, as the raising the hill high. Let him therefore chuse them from such hills as have been most raised the preceding year, and from such as are fullest of shoots; because this also is a sign that the roots whence they come are hearty.

Having fixed upon the hills, let him chuse the largest sets, and see them taken carefully up, they should be ten inches long, and have four joints or buds. When a proper quantity are taken up, according to the number of hills there are to be, let them be laid in the ground in a cold and damp place, and taken out as the holes are prepared for their reception. In the center of every hole that has been filled up with the compost, let there be a square opening made of a foot deep, throwing up the earth on the sides. Into this, which must be a full foot deep, put four of the sets. Place one at each corner: set them upright, with the top just level with the surface of the ground, and then throw in the earth that had been dug out, fixing it well about the roots. Cover the tops about two inches with the finest and lightest of the mould, and the hole is finished. Thus the foundation of one hill is laid.

In



In the same manner plant four sets in each hole. A thousand hills will stand in an acre of ground, supposing it of the middling kind; and this is the whole trouble of planting them. The expence is not great, for the sets are sold cheap enough, and an expert person makes quick work in planting them. The husbandman sees the ease with which hops are raised, we shall now tell him the encouragement he has to plant them. No produce whatsoever is equal to them: they may reasonably be expected to yield fifty pound an acre, and sometimes in favourable seasons, when the soil and situation are right, an hundred. Nothing is more surprising than that hops are not propagated universally: at present the planter need not be afraid of overstocking the market. The demand is greater by much than the supply; and we annually import a vast quantity of them from Flanders, though inferior to our own. No country so much favours their growth as England; nor is there any county throughout the kingdom where they may not be raised to this certain and vast profit. These are the common rules observed in putting the sets into the ground; but as this is an article of the greatest consequence, we shall enlarge upon the particulars.

Let the planter see that his holes are perfectly prepared, before the sets are taken out of the ground, for the best care that can be taken of them is the putting them quickly into their places, nothing prejudicing them so much as keeping them long out of the earth. In taking them up the greatest caution is to be used, not to bruise the roots; and whatsoever parts of them may happen to be so injured, must be cut off above the bruised part, for this always decays; whereas, when the roots are cut off clean, they not only are so many mouths themselves, but every one of them shoots out several small roots. The bruised parts grow presently mouldy, and the infection spreads from them to the rest of the plant: every fibre that runs near one of these mouldy ones is sure to be tainted.

Not only the fibres are to be cut off at the ends, and the injured roots to be taken away, but if there be any roots that run crosswise of one another, or any that spread with a tendency upward, the first are to be cut quite off, and the others are to be shortened almost to the set. The cross roots, if too near, will press and injure one another; and the hop is to root deep in the ground, therefore the others straggle in a wrong manner. As to the depth of the holes, what we have given is a general rule, but it may admit of exceptions: we are to accommodate ourselves to the condition of the ground. If that be rich, free, and fine, we may plant the deeper, but if it have a bad bottom



we must go the shallower in the first setting, leaving the plants to push afterwards.

When the hole is dug and the plants are ready, let the planter observe that he set them so, that as near as may be they may stand covered just as far as the point or head: when the hole is square, four are to be placed at the corners; and if one more be added, it must be just in the center; if two more, in a line going across the middle, and at equal distances from all the other. When the sets are in the hole let the compost that is to fill it up be broke very fine with a spade, and thrown in a little at a time. In this manner it will fall all round them, and about each set, leaving no hollows. When a little is thrown in it is to be settled about them with the hand, and when all is in, it is to be pressed with the feet, but not too hard: the intent is, that it may every where fall close about them, and yet it is not to cake about their stems. Some who plant in spring, if the season be dry, water their young sets, but this is altogether wrong. The depth at which they are planted is such, that the earth will always have dampness enough to support them, and it is a season when there must come rains sooner or later.

There are people who, instead of opening the whole hole, and setting in the plants regularly by hand, place them in the new made ground with a setting stick, closing the earth about them as gardeners do in the common way of planting: but this is a very slight and inconsiderate method: the hop plantation is an undertaking of great consequence, and 'tis worth while always to set about it with care, and all possible advantage of the ground: the success of the first year will over-pay any extraordinary or particular expence on that head. When the planter has got his sets into the ground, let him leave them to nature for their growth, and the next summer let him watch them in their fruiting. Some will rise worse than others, but he will find some better: he is to mark the hills of both kinds, the worst to take away, and the better to propagate. Let him take care of those hills on which the fine ones grow; and the next year, when the time of tying is come, the superfluous shoots on these fine hills are to be reserved for laying. When the others are tied up, these are to be cut off at the top, and laid all the rest of their length, burying them in the ground; in this condition they will each send up a great number of strong and healthy sets, which in the succeeding autumn may be planted out into places where the hops were worse than the rest. In this way every year the hop ground will be improving, and by proper management, and due tendence, will succeed perfectly.



## CHAP. VI.

*Of dressing and managing a hop ground.*

THE profit from the hop is very certain ; though it vary greatly, according to the seasons and other accidents ; but this supposes a due knowledge and care in the dressing of the ground. It will be six times as great from a ground well, as from one ill managed. The farmer is not to look for this information among the planters themselves, for they know little, and that little they keep secret. Half their plantations are poor, from want of care or want of judgment ; and from what I have seen I shall freely add, that the very best of them do not yield half their natural produce. There is not any hop ground I have seen but might double the owner's profits, with a more judicious and diligent management : we shall lay down the perfect method, and it will be found not at all difficult or perplexed : when so familiar a practice is rightly understood, let it be carefully followed. The expence is very moderate ; and though the plantation is liable to accidents, more than any other growth whatsoever, yet with due care one half of them may be prevented, and the greatest mischief of the other remedied.

The first dressing depends on two principles, the earth is to be broken that the roots may find an easy passage ; and the weeds are to be destroyed as they rise. There is no way so proper as by the horsehoeing. The young plants will have the winter for fixing themselves in the earth, they will shoot out fresh roots before the cold reaches the depths at which they are planted ; and these will strengthen well in the ground before spring, so that they will then shoot vigorously.

## CHAP. VII.

*Of polling the hops.*

POLES are next to be provided : for the sooner they are fixed the better, that the roots may not be disturbed by them. Three, four, or five poles must be allowed for each hill : the difference is to be made according to the distance of the hills ; if these be at seven foot three poles will do for each, if at eight foot four, and if the distance of the hills be nine foot, there should be five poles to each. The bigness and length of the poles are to be proportioned to the condition of the ground, and the growth of the hops. In moderate grounds poles of a moderate lize will do, but in rich earth, where the growth is strong, the poles must be large, stout, and very tall, otherwise a great part of the profit may be lost.

The growth of the hop will be in a great measure determined by



by the length of the pole ; if that be tall the stalk will run up, and if the ground be but poor, the whole nourishment will be exhausted on the stem and leaves which should go to the fruit, so that they will make but a poor progress. A caution is therefore necessary against over-polling, than which there is no error more destructive. When the hills are placed at such a distance that there is space for the roots going far for nourishment, and that is provided in abundance by the dressing, in that case we can get no poles too long ; for there are none so high but the stem of the hop can get to their top, and flourish over it ; and yet have strength at the root for nourishing and filling the fruit, which will in this case be the more numerous in proportion as the plant is larger and spreads more.

We are speaking of the first year of a hop ground, and in this some particular caution is necessary. If the ground be but indifferent, let the poles be very short this first year, for nothing is so dangerous as carrying up the plants too much in height the first season in such ground. If they be led into a habit of running too much into stem this year, the fruit will be small, and the fault never be recovered. Even in the best grounds where soon after no poles can be too long, it is a good caution to use such as are shorter the first year ; not tempting the plants to run up too high, but encouraging them into fruit. They will take the advantage of the longest poles afterwards, and fill the whole growth with fruit. An acre of hop ground will require between three and four thousand poles. Let these be laid in upon the ground between the hills, to be in readiness. Fifteen foot is a moderate length. The largest poles should be twenty foot long, and seven inches round, but these are too big for any condition of the hops the first year ; so that somewhat smaller are better in all kinds in the beginning. Alder poles are very proper, they are strait and run high ; ash also are excellent, because of their toughness, and there are some other woods that do well enough. They should be cut with a fork at the top, for it serves to give a supply to the head of the plant, and is of the greatest service.

The time of polling requires care, it must not be done before the shoots appear above ground ; and on the other hand, if it be deferred long after they have shot, the plants will be checked, for the hop stops presently in its free shoot, if it have not a support. This work is to be begun after the shoots appear, and must be finished before they are any where three foot high. This in a large ground is a sharp business. The poles are to be fixed near each hill, three, four, or five to each, according to the rule before laid down : they are to be fixed in  
depth



depth according to their height, and to the condition and exposure of the ground. The richer the ground the deeper they must go, and the more they are exposed the firmer they must be placed; indeed we have observed that a hop ground never is to be in an exposed situation, so that the danger there ought not to be great. Nothing is so destructive as the rising of a pole out of the ground: the breaking of one, though a troublesome accident, is not near so bad; on this principle let him work, fixing them in the ground so firm, that they will sooner break than rise. They must always be placed so as to lean a little outward; though not much. It is natural to plant them slanting inwards, and ever so little of this is wrong. The hop requires a free air, and this is prevented by the poles bending in. Most of the disorders of hops arise from the want of a free passage of air. If the poles slant inward ever so little, the weight of the hops will soon make it more, and they will close at the top like a canopy: the consequence of this is a certain taint in the hops.

To prevent this we order the poles to be fixed slanting a little outwards; but if they slant too much the weight of the hop will lean them down the other way, which is also wrong. Let the planter observe how the tops of the poles stand when he has fixed them; if they are a very little more distant at the top than at the bottom they are right, not otherwise. They should be made also to lean a little toward the south. This gives the sun opportunity to shine in among them; which is of the utmost consequence. Hops perspire a great deal, and that damp vapour is apt to hang amongst them. This taints them, and is the origin of many of their disorders. The sun shining freely in, dispels this and warms the plants; it keeps them from damage, and assists the growth and ripening of the fruit. This leaning however must be but moderate: if great it prevents the very intent wherewith it is done, for the plants will obscure one another. A pole which leans a little will bear one third more hops, than one under all the same advantages in other respects, that stands quite upright: but of this I can assure the planter, from my own experience also, that a pole that leans too much will yield fewer hops by one third than one which stands perpendicular; and beside the defect in its own bearing, will hinder that of others. There is another substantial reason against the too great leaning of an hop hole, that is, the danger of its breaking, or of its tearing up, when the weight of the hop bears upon it.



## C H A P. VIII.

*Of inspecting the polling.*

**A**N accident in the polling of hops, if seen in time, is easily remedied. If upon the shooting of the hop at six or seven foot high, it be seen to be over-pollled, that is, if the pole be so tall that it will be apt to carry it up in length, and prevent its fruiting well, it may be unwound from the pole, that may be taken up, and another set in its place, and the hop brought carefully round it: it will take to it as naturally as to the first. If it be seen, from the free growing and promising aspect of a plant, that it is under-pollled, or that it will bear a taller and stouter pole, it may be unwound, and such a one set in the place of the other.

Let the planter inspect also the condition of his poles, as to their firmness in the earth; especially in places where the wind has most power. When he sees any in danger, let him order a man with a rammer to force down the mould, on the side of the pole opposite to the wind, which will enable it to resist the efforts. Let him have spare poles of different sizes, not only for the replacing such as are too small or too large for their plants, but for the supplying the place of such as shall break. This must speedily be remedied. A hop plant that is suffered to lie upon the ground, will yield very little. Let him be ready not only to remedy such accidents, but to prevent them. He will see where a pole is over-burthened; and let him not stay for the accident, but place in a spare pole to support the other. Finally, where he has not perceived in time, that a hop was under-pollled, but sees it requires a taller, when it is too late to unwind it, let him place a spare pole near the other, and tie the hop to it, that it may have a fresh support, and room to spread to the greatest advantage.

## C H A P. XI.

*Of the tying of hops.*

**I**T will be time to begin tying by that time the poles are all well in the ground: for the proper time to begin to lead the plant is at about a yard high. Let it be considered what each pole may bear, and so the plants proportioned to them. Let each shoot be led to the proper pole, which is usually the nearest, and let it be wound once or twice about it, in a direction according to the course of the sun, for the heat naturally draws the shoot that way. When it is thus fixed to the pole it is to be tied round, to keep it there. Any soft matter does for this purpose; a piece of bass, or withered rush, or a fragment of yarn.



yarn. Let them be tied in two or three places, but let a great deal of caution be used in doing it, that they are not press'd, for the young shoots are tender. The heat of the day is the best time for the doing this, for in the morning, being full of juice, they are brittle: the heat of the sun evaporates some of it, and they then will better bear a touch.

After this there must be no more tying, but the plants will still require guiding, to keep them properly to the poles. We shall be now advanced to the second stage of growth: our hops which have been tied some little time, will continue shooting very quick; and in general, if they have been carefully wound and tied, they will follow the course intended round the pole, freely and favourably. There may have been less care taken of some, and there will be some plants luxuriant and very cross-grained, that will ramble from their poles, and hang wild and drooping. These must be set right with the hand, for the first week or ten days: toward the end of April the planter must himself go over his whole ground again, and see what farther is amiss in the same way. The tops which straggle from their poles, will now be above the reach of his hand; he must therefore take a forked stick, of five or six foot long, and with this turn and direct them properly to the poles, which they will readily enough take to when once put round, though they had straggled naturally ever so much from them.

A fortnight after this, that is, toward the middle of May, let him go round once again, with the same design. His workmen must have general orders to rectify what is casually amiss, from day to day; but these are the periods whereat he should go through the whole himself. When we advise this compleat attendance, we suppose the ground to be but of a moderate extent, and the planter not much pressed by other affairs. When the ground is larger, and the owner has business that will not permit himself to attend, he must depute some careful and faithful person; and still follow at times with his eye, what he does not execute with his own hand. At this inspection in May, the greatest care is required, because it will be the last time of going over the ground; and because faults at this time are of worse consequence than any other. He will find several plants that have straggled from their poles, or that grow crossly since his last reducing of them. They are very strong at this season, and the least fault encreases to a great one presently, therefore let him go over them now with redoubled care. Neither his hand nor the stick will now reach them; whoever does the business must be followed by a labourer with a ladder, with a back to it, and this must be set down against the pole where there



there is any thing amiss : every fault is to be thoroughly rectified, and they are then to be left to themselves for a month.

C H A P. X.

*Of clearing the ground and raising the hills.*

**T**HIS is an article which many practise too slightly. The hops are at a good growth toward the latter end of May, and being directed rightly in their course along the poles, they are prepared for a beneficial crop. We are now to proceed to the shortening the plants, but as it is a month before that is to be performed, it will be proper to consider the condition of the ground, and the work that is to be done in the mean time below. The earth is to be stirred from time to time between the hills, and weeds are to be destroyed as they rise : this is a general direction, but we are to come to particulars in this place. We have spoken of hills in the hop ground : that name is given to them in consideration of what they are to be, rather than what they are in so young a state of the plantation as that we have hitherto described ; they as yet rise only two or three inches above the level of the rest, and are of a small diameter. We see them larger in old grounds, and we are now about to enlarge them in our new one. Holes were dug for the planting, these were filled with compost, four of the sets were planted at the four corners of each hole, and the earth was raised two inches over their tops, which were on a level with the surface ; therefore the spots where they now stand are a little raised, and the level ground between is plain, as the harrow left it.

In this condition we see it in the beginning of June, and we then are to begin to give it more the form and appearance of an older hop ground. After the first shower let a number of labourers be sent in, with an overseer of the work ; he is to set them to pare off the surface of the earth between the hills, about two inches deep : himself is in the mean time to be at work at the hills. He is with a careful hand to cut away all the superfluous shoots of hops, and thoroughly to destroy all the weeds that rise upon the hills ; this earth which the labourers pare from the surface, is then to be shovelled to the adjoining hills, and carefully laid upon them. In this manner they will be increased both in height and breadth, and the ground will have more appearance of what it really is. We mention the spade for this purpose, because it will suit a moderately large ground. In a very small one the handhoe will do ; and in a larger the horsehoe, or hoe plow, is best of all. It is the best method to set out with a large piece of ground at once, and to prepare it for this instrument by the disposition of the



hills as we have directed; there is no article in which it is more largely serviceable; nor will any hop ground succeed so well nearly, as one that is so managed. Whichever method be taken, the work is to be conducted in the same manner, the hills are to be raised, with the earth thrown up, and the weeds to be destroyed. This is to be repeated once in three weeks, during the summer, in the same manner; always taking the advantage of some rains: for the earth cuts better, and every thing is more compleatly done at such a season. This perfectly kills all weeds, and the earth added from time to time, keeps the hills moist, and gives nourishment to such new roots as shoot from the upper part of the set.

## C H A P. XI.

*Of shortening the hop plant.*

**T**HIS is much more essential to the success of the plantation than some imagine. It depends upon a plain and certain principle in vegetation, that in order to promote a plant's bearing a great quantity of fruit, it is not to be suffered to spread too much into leaves, or to rise too much in height. We left our hops at the end of May conducted along their poles; a full month they will be growing in length, but at the end of that time they should begin to branch. Many of them will naturally, but such as do not, must be put into the way of it, by taking off the top shoot. Some prevent the shooting farther of the stem at this time by turning it from the pole, and this sometimes answers, but it is not so certain or so speedy a way as the other. The ladder with its stay is to be brought into the ground again, and set against every hill; such plants as have begun to spread, are to be left to nature; for the branches will draw the nourishment, and there will not be any abundant quantity sent into the top shoot. But where nature pushes all her store that way, and there is no appearance of branches, the bud or top of the shoot is to be pinched off. This stopping its progress that way, will give all the sap to new shoots and branches. The more of these there are the better; and as they seldom grow much till toward the end of June, they are then prevented from being luxuriant by the great quantity of sap that is sent to the fruit.

This is a provision of nature in favour of the planter, but he must favour it, otherwise accidents will interfere and prevent much of the advantage. About midsummer, the hop plant begins to branch: but if a rainy season, or any other accident tend to interrupt this, and continue its growth in length, he is to stop it by pinching off the bud. A plant that would have



have run into a useless stem, or when there were branches formed, would have extended them to a great length, at the expence of what was to be of value, will by this management be thrown into a proper course, its stem shortened, and the branches stopped in their growth till every part be full of buds for fruit.

The planter is only to observe their ripening: in this he is to wait the course of nature, he can do nothing to assist her; and he is only to watch that he may take the most favourable opportunity for gathering those fruits, the free growth of which he has promoted by his industry and care.

## C H A P. XII.

### *Of the gathering of hops.*

**H**OPS begin to flower about the last week in July: in a fortnight after this the fruit begins to form itself: this is called the belling of the hop, and it is to be expected in the beginning of August: from this time three weeks, in a good season, compleatly ripens them. So that the planter may expect them in condition to gather in very favourable seasons, in the end of August; in middling times, in the beginning of September; and in the worst, soon after the middle of that month. The owner must watch carefully for this ripening: let him begin the last week in August to examine them daily, and so continue till he find them fit for gathering. The marks of their ripeness are these. First they change colour. This is a sure token that their maturity is coming on: after this they begin to smell fragrant and sweet; in a few days after the seeds upon examination will be found turned brown. Soon after this the hop will easily fall to pieces.

These are the four stages of ripening; in the first and second that period is coming on; in the third, it is perfect; that is, when the hop has changed colour, when the smell is strong, and the seeds are brown, it is perfectly ripe: in the fourth stage it is beginning to fade, for this is the course of nature. When things have attained perfection, the next step is decay. The progress in the hop is very quick. When the owner perceives them to have all the signs of ripeness, let him get together all the hands he can for a quick gathering. One day hanging upon the plant after they are fully ripe hurts them, and if there should happen a windy night, he may receive vast damage.

Many gather their hops irregularly, and by that suffer a great deal of loss. The best manner is this. Begin in the centre of the ground: cut down four hills that stand together, cut the roots even with the ground, then lay the four hills, and the



ground that is between them all level, in the manner of a floor: water this, beat it with a mall, such as they use in turfing, then sweep it and roll it with a heavy roller. This will be a fine level floor to pick the hops upon. To this they are to be brought from all parts of the ground, if it be a small one; but in very large grounds, another or several others according to the extent, are to be made in different places, for the convenience of bringing the hops from every part to them. The hops are laid on this floor, and the pickers are to sit all round it, and to pick them into baskets; the floor is to be cleaned and swept once in three hours, and this way the work is continued till all is finished.

In taking up the hop plants, let the person go round those he is about to raise, with a long pole in his hand, with a sharp hook at the end of it: let him observe where the tops of those poles he is about to take up, grow entangled with others, and with this hook cut all these gently asunder. Every thing is to be done with care and caution, and if this should be omitted, the stalks would pull one another, and shake off the fruit in removing. When the plants are thus cleared, he is to cut them off at the bottom. It is a common custom to cut them near the ground, but this is a great error. The hop is in a condition of strength at this season, vast quantities of sap have risen for the filling of the fruit, and they continue rising, so that in cutting the plant off near the ground, a wound is made that bleeds a great deal to the weakening of the root. The proper method is to cut them a yard from the root, and they must be taken up only as they are wanted, proportioning the quantity taken at a time to the number of persons picking. As many plants should be cut off at once as will find them employment a quarter of a day; 'tis hazardous to venture cutting up any more, for either a hot sun, or a shower of rain will do them a great deal of harm.

When the plants are loosened from their intanglings at top, and cut off at bottom, they are not to be unwound from the poles, for they twist themselves too closely, and too irregularly about them for that; the poles are to be taken up, and the hops picked off while the plants are on them. The method is to raise the poles out of the ground. The planter should have a large pair of knippers, and a block of wood to lay near the pole, that while the opening of the knippers takes hold, their handles may have the effect of a lever. These knippers may be of wood or iron, the latter is more expensive, but better. They should be made with very long and strong handles, and should open like a smith's tongs, but be well toothed on the inside.



side. Rock the pole about with the hand, and lay the block of wood near it: then the points of the knippers are to be thrust into the ground open, to take in the pole, and the handles are to rest upon the block. When they are closed, and have good hold, the pole is to be raised out of the ground by bearing against the block. The wooden instrument for this purpose must be a large, long, and strong lever, split and kept open at the end. There must be iron teeth in this open part, and it is to be used exactly as the former. The hop poles should have a fork at the end for the better keeping the top of the plant, but for the common way of picking upon the floor, it is best they should not, because they come the easier off when the end is single.

The picking of hops must be done clean: fragments of stalks diminish their value. The little these foulnesses add to the weight, is of no consideration compared with the reduction they occasion in the price. There is a dispute among the planters at what exact degree of ripeness it is most profitable to gather hops. When hops are but moderately ripe, they are of a better colour, and they preserve it when dry, and at the same time they are sure to retain all their seeds, in which their greatest virtue lies: this has led many away at once to the resolving to gather them in this state. The advantages are certain, and apparent; but let us examine the other side of the question. The hop does not dry to so fine a colour when full ripe, and it naturally drops some of the seeds; but on the other hand, the full ripe hop has its full substance, which the other has not: and as it is less watery, it does not lose so much weight in drying. Five pounds of moderately ripe hops yield a pound dry, and four pounds of full ripe ones do the same. Therefore though the others bring a large price at market, yet unless it be larger by that difference, the advantage will be in letting the hop stand to its full ripeness. The planter may take his choice,

### C H A P. XIII.

#### *Of the drying of hops.*

**T**HIS is to be done by a kiln, and we are to caution the planter to be very quick in doing it. No time is to be lost in the picking after the hops are cut up; and when they are picked none is to be lost in drying them. Their lying but a little while together will heat them: the first effect of this is the loss of their colour, the next their smell. Few let them lie long enough to incur the last damage, but the former is too frequent, and it is never to be remedied. It may happen that the



kiln is full when a great many are picked and ready for drying. This is to be avoided as carefully as possible, by proportioning one part of the work to another: but if it happen, the method is to spread them very thin upon the floor of some covered place where there is a thorough air, that what drying they thus get naturally may be regular. A small quantity of hops will dry compleatly thus; and a larger will get no damage in lying a day or two; and it must be very bad management indeed if the kiln is not by that time ready. Nothing is so easily damaged as the hop in drying: and all the care bestowed in the raising of it is thus rendered ineffectual; for the price is reduced at market, and the value also for home consumption. The merit of the hop is its perfect fragrance and fine colour, and these can never be preserved but by the most careful manner of curing.

Let the planter be cautious not only that his hops be dried well, but that they be all dried alike. If one parcel differ from the rest, let him keep them separate; for one pound of ill dried hops, mixed with fifty of the best preserved that can be, will destroy the true and rich smell of the whole. It is a practice in some of our hop countries, to dry them in a malt kiln, upon a hair cloth. In Flanders they build a kind of kiln on purpose; and in some other places they alter the malt kiln for this use: we shall give the planter his choice of these several ways, but not without pointing out to him which deserves the preference.

#### C H A P. XIV.

##### *The Flemish manner of drying hops.*

**T**HE method used in Flanders is to build a kiln of brick; which is a room of about ten foot wide. The door is made on one side, and the fire place is in the center, and for a room of ten foot, this is fifteen inches wide in the clear, and so many deep, and its length within five foot that of the room; it is to run all along the middle, and to terminate two foot and a half from each end; that the person who has the care of the work may go round it: or it may be free only at one end for a passage, and be made in the manner of the fire place of our common malt kilns, the fire passing out at holes on each side. This fire place must be made on the floor: and four foot above the top of it is to be the bed, whereon the hops are to lie. This must have a wall of three or four foot high, to keep them from falling off. Adjoining to the kiln there must be a room into which the hops are to be put when dry; and a window is to open out of the place where the bed is, into this room, that they may be shovelled through without trouble. The best floor  
for



for the bed is made of rails like our pantile laths, they are to be an inch square, and perfectly well planed; and they are to be placed a quarter of an inch asunder, that the heat may freely pass through, and the smallest hop not fall out. There generally runs a beam cross the bed in the middle, and the rails are all let into that even with its top.

When this kiln is prepared, the hops are to be thrown in as they are picked, one basketful after another, till the whole bed is full, and they lie a foot and half deep upon it. They must lie as they fall, and not be pressed down any way: only it will be proper to draw a wooden rake over the surface, that they may not lie thicker in one place than another; but this must be done lightly. When the hops are in, the fire is to be kindled. In Flanders they burn dry wood, and that often but of an indifferent kind; but it is much more proper to use charcoal, which we would advise the planter to burn himself, with a particular care, for that purpose.

The Flemish hops are commonly censured for having an ill smell; and this is owing entirely to the practice of burning wood under them. Let the clean fuel we have directed be used, and that fault will be perfectly avoided. The fire must be a pretty good one, but it is not to be continued all along the fire place, it must be only at the mouth of the furnace; for being well kept up there, the air which passes through will convey the heat to every part of the kiln. This fire is to be continued till they are thoroughly dry, but this must be carefully regarded, for they sometimes do not dry equally.

To try whether they are dry enough, examine them at top; if they are thoroughly dry there they will rattle on drawing a stick over them; and if they are thus dry in some places, and less in others, they must be thinned where they are dampest, throwing what are taken off upon the dryest places: thus the fire being continued they will soon be all finished.

The great care is to keep an equal quantity of fire all the time. When they all appear thoroughly dry by their colour, aspect, and rattling, they are to be tried by breaking the inner stalk, if that snap freely they are as they should be. If they are not found to be perfectly cured, the fire is to be continued a little longer: if they be finished it is to be let out, and the hops are to be shovelled out at the window, into the room prepared for receiving them. After this the floor of the kiln is to be swept, and what seeds and broken hops have fallen through the railing, must be got together and put to the rest. Then a fresh quantity of hops are to be put in, and the whole procedure repeated,



## C H A P. XV.

*The way of drying hops in a malt kiln.*

**T**HIS method comes easier than the other, where there is a malt kiln in readiness, because the trouble and expence of a particular building is saved. The structure of a malt kiln, is sufficiently known. The manner of employing it for the drying of hops is this: a hair cloth is to be used as a bed for the hops, and they are to be spread upon it six inches thick. They are to be thus kept over the fire made in the usual way, till they are half dry; then they are turned with a scoop made for that purpose, the lower part upwards, and the upper part, which was least done, lowest; and thus they are to lie till the whole quantity is thoroughly dried.

When they are done the hair cloth is removed, and they are thrown into a room; where they lie ready for bagging. In favour of this method nothing can be said, but that for small quantities, where there is a malt kiln near, it may save expence. The hop branch however is so profitable, that we shall advise the farmer to set out in it boldly, taking a large ground, and not sparing the first expence: so that this expedient will be of little service to him. For those who use this, they are to be advised to take great care in the turning, to do it gently; and to use clean fuel; and keep the heat uniform and equal during the whole time.

## C H A P. XVI.

*Of drying hops in a malt kiln fitted to the purpose.*

**A** Better method of drying hops, is by preparing a malt kiln for that purpose. In the Flemish way the fire must be continued longer than in any other, because there is so large a body of hops to dry; and as they are never turned, the under ones will be more done than the upper, and must be over-done in the drying the upper ones sufficiently: therefore there is more time, more charge in watching, and more fuel than need be; and a great part of the hops are too much dried, by which they lose both weight and colour. In the way by the malt kiln and hair cloth, the turning is a great inconvenience, for many of the hops are shattered and broken; to which not only the motion of turning, but the roughness of the hair cloth contributes; and a great deal of the seed is scattered and lost by the motion. These are less inconveniences than those in the Flemish way, but they are very great. A great deal of the virtue of the hop is in the seed, therefore this is a damage; and the breaking it always injures the price at market,

We



We shall attempt to give a method that has been practised in some places many years, and the advantages are so great, that 'tis pity it should not be universal. Let there be a kiln, the lower part of which shall be, in all respects, the same with that of a common malt kiln. A common malt kiln may be used for this purpose, with the following additions; or there may be one purposely erected in the same manner. When the kiln is so far prepared, the bed for the hops is to be thus made. Frame together a quantity of slips of deal well planed, let them be three inches broad, one inch thick, and of such length as suits the kiln. Let these be laid checkerwise one over another, at four inches distance; let those which lie uppermost be let into the lower, and the whole surface kept smooth and perfectly even. This frame must be supported by joists set edgewise, and so placed as to lie in a true level. Then prepare a covering for it, of that strong kind of tin called double tin. Let the measure be carefully taken, and the plates of tin well soldered together, and let the laying of the several plates be so contrived, that the joints fall upon the middle of the ledges. When the frame is well tinned let there be four sides of boards made to it. Three of these are to be fixed, but the fourth must have hinges: it is to be hooked up in the time of using; but when the hops are dried and are to be removed, it is to be let down, so that they can be pushed gently off without breaking. When the bed is finished let there be a cover prepared for it. This must be exactly of the same length and breadth, it must be made of boards, and framed together; the lighter the better. The face of this must be covered with tin plates, laid on evenly. This cover is to be hung flat from the roof of the kiln, at a considerable height above the bed, but so contrived that it may be let lower upon occasion, when it is wanted. The bed being thus prepared, and its cover hung over it, conveyances for the smoak must be made at the sides and corners of the kiln, and then the whole is ready.

There will be some expence in fitting up this kind of kiln at first, but it very richly answers. Less time and less fire are required, and almost any kind of fuel will serve. In the Flemish way there is a great error, in using foul fuel, but in this method less caution is necessary. There the smoak or vapour of the fuel lodges among the hops as they are drying, because the bottom of the bed is open; but here, as that is covered with tin, the vapour never gets among the hops. Suppose a parcel of hops picked and ready for drying, let them be carefully emptied into this bed by basketfuls, and spread a little about by the gentle motion of a stick, in the hand of a person who can  
go



go along the sides of the bed, and from one part or other reach over it; the hops are to be spread about till the bottom of the bed is covered eight inches deep with them pretty evenly. The fire is then to be lighted and kept up equally, till the lower part are dry, and the greatest quantity of the moisture is evaporated from the whole. Then let the cover be gently let down till it comes within ten inches of the surface of the hops, the fire being all this time continued as at first; the effect of this cover will be like the dome of a reverberatory furnace, it will reflect back the heat upon the hops, in such manner that the top part shall soon be as dry as the bottom.

When all are dry enough the hinged side is to be let down, and being supported slanting downwards with a gentle descent from the level of the bed, the hops are to be pushed out carefully with a board at the end of a pole: and the side being put up again all is to be continued in the same manner, with a fresh parcel of hops. To save the expence of this cover, a flat scoop may be used to turn the hops when they are two thirds done, but this is some labour; and all motion hurts the hops. The expence of the cover need not be any thing like that of the bed, for rough boards will serve, and common tin plates nailed on will perfectly well answer for the facing of it. In this manner the price is moderate, but if it were much more it would be easily saved in a little time, in the advantage the hops get by drying without turning.

## C H A P. XVII.

*Of the bagging of hops.*

**W**E shall now proceed to the packing the hops up in bags. A room is to be prepared for receiving them from the kiln. This must be dry and airy.

The hop is not to be packed up directly from the kiln, for it is then very brittle. They would be brittle, and would have too much heat among them, and this not going off freely would damage them. They must lie in this room till they have thoroughly cooled; and they will, in that time, grow so tough, that they may be pressed in packing without fear of hurting them. Three weeks is the least time they should lie for this purpose, and according to the season, and other accidents, it will be proper sometimes to allow them a month. If the weather be moderate they will come to a proper toughness very well, lying open; but if it be hot and dry 'tis best to spread blankets over them. The room into which the hops are received from the bed of the kiln, should be pretty near the same level with the bottom of the bed, that they may not be hurt by falling



falling too far : this also answers another purpose ; for being at this height there may be another room under it, which is quite necessary for the bagging.

In the middle of the floor of the room into which the hops are received from the kiln, there must be opened a hole communicating with the room underneath. This must be four foot long, and three and an half wide. The bag into which the hops are to be received must have a hoop fastened to its top, the edge all the way round is to be turned over the hoop, and fastened with packthread in a large needle. This hoop is to be of such a size that it cannot go through the hole. The bag being thus prepared is to be let thro' the hole, the hoop supporting its top remaining above ; and this is to be very well fastened in, because it is to bear the weight and force in the treading. The bag being let through, toss in a small quantity of hops, and then going into the lower room, gather up some of them to the corners, and tye in a small parcel into each corner, with a packthread put strongly round. These resemble tossels or pincushions, and are very serviceable afterwards in managing the hops. When this is done let more hops be thrown in, and let the man who packs them get into the bag, dispersing them evenly, and treading them down as fast as they are thrown in : this is to be done till the bag is full. Then it is to be unripped from the hoop, and its top sowed firmly together, making a couple of little bunches at the corners, as there were at the bottom. In these bags the hops are ready for the market, and if the owner have a mind to wait for a more favourable time for selling them, they will keep in a dry room without damage.

#### C H A P. XVIII.

*Of the management of the hop ground after the hops are gathered.*

**W**HEN the picking is over clean off the stems of the hops from the poles, and lay these up dry for another year, the best way is to place them in a heap under some shed. In large grounds 'tis worth while to erect a shed for the season of picking, that this may be done under cover : the same building will then serve for keeping the poles till spring. Some raise them in heaps hollow within, and standing like a pyramid, but the outside poles are damaged in this way, and the tops of them all. Others lay them in heaps exposed : only spreading the dry plants over them, but this rots them. The method of housing them is much better ; and the poles come so dear, and the shed may be raised for so little price, that 'tis worth while to do it only for that purpose. The ground is to be left untouched



touched till spring: but it will be needful to give it a good dressing then; and the manure should be got ready during the dead season. As the planter used a compost for receiving his sets at first, he is to follow the same method in dressing the ground afterwards. Hops will be much improved by dung; but they cannot bear such as is new: it will utterly destroy them. Upon the proper condition of this manure, and the due dressing of the ground, will depend the success of the next year.

Mix ten load of dung, that is at least a year old, with two load of common garden mould; and half a load of sharp sand: stir and work all this thoroughly together in November, and let it lie till spring. The last week in March plow the ground lightly over, then bring out all the old haulm or dry stems of the hops that were taken off the poles the last autumn, lay it in heaps in different parts of the ground, and let labourers shovel some of the surface of the ground upon the heaps. Then set them on fire and reduce them to ashes. These ashes will lie in heaps, and let the compost laid together in November, be now brought into the ground, and equal quantities of it laid on every heap. Let a labourer mix the earth and ashes with the compost. And this becomes an extremely rich manure, and agrees perfectly well with the hop. As soon as this mixture is prepared, which will probably be within the week, or in the very beginning of April, let the hills be opened, and they are to be refreshed with it.

It is the custom of many to dress the ground earlier, but experience has shewn us this time is better. The hop is a plant that shoots late, and 'tis happy for the planter that it does; for when a forward spring brings the shoots early, there generally happen some injuries to them. This late dressing keeps them backward in springing, and at the same time thoroughly destroying the weeds so late, they do not rise of a considerable time. The manner of doing it is this. The hills are to be one after another pulled down, and the roots examined. These are of two kinds, the old and the new; the old are all to be preserved, and the new which shoot sideways are to be cut away. The old roots are reddish, and the new are white, so that the colour easily distinguishes them. But let the planter remember that all the new roots are not to be cut off, but those only which shoot sideways: such as run downwards are to be preserved. The same discretion is to be used with the shoots. The old sets are to be preserved, and here and there a good young one that is well placed, is to be left with them, the rest are to be taken off; they are ready for planting in new ground if wanted: if not let them be thrown away.

When



When the roots and sets are cleared, let the earth that was taken from them, and that removed by the breaking of the hills, be thrown into the spaces between the hills; and let the hills be made up to a due height, with the mixed compost and ashes, and calcined earth; which together makes an excellent manure. The young shoots are to be cut off at an inch from the old one this first dressing, but every year afterwards they must be cut away close. It will often happen that the set of a good hop degenerates into a wild kind: in this case let the hill where this stood be marked at the time of gathering; and at this spring dressing let it be entirely taken to pieces, the former sets removed, and let some of the best of those produced by the good kinds be planted in their place. The hills must not be made too high at first, because the ground is to be pared in the summer, and these parings are to be laid upon them. If they were too high at first, they could not bear this addition, the use of which we have shewn already.

Some of the hops will be shot up: but he is not to regard this. The cutting off a top at this season does no harm: but this being once done, and the hills made, let him take care no injury is done to them afterwards. Vermin and poultry are to be kept off: of all birds he is to be the most aware of the goose.

#### C H A P. XIX.

##### *Of dressing an old hop ground.*

**T**HE hop plant comes to its full vigour the third year, and will last a great while; but time wears out the strength and heart; and sometimes neglect will bring the ground in a few years to the condition it would have fallen into necessarily after this full period. In either case the same method is to be followed. The dressing of the ground must be begun in winter. Let the whole space between the hills be plowed up with a four coultered plow, that it may be cut deep and thoroughly broken: and let there be in readiness some of the compost before described. When the spaces are broken up, let the hills be pulled down as far as can be with safety to the plants, and let their earth, and some of that which is nearest them in the spaces, be thrown to a distance, and bring in the compost to supply its place about them. This deep plowing will destroy weeds, and the addition of new stuff will give the hops the advantage so far, of not only new ground but very rich. There is another benefit in this method: the hop is at once encouraged to send out new roots, and nourishment is provided for them.

To explain this, let us set before the reader the real state of a decayed hop-ground, as it would appear if the whole were exposed



exposed to the eye. Here are a number of hills with strong old plants upon them, and here is a great extent of ground between and about them, which is hard at a little depth. The surface of this ground may have been stirred to four, five, or six inches deep, but never more since the ground was made: under that it is perfectly firm, as if never broken by any tillage. The roots of hops do not spread near the surface, nor should be suffered to do so. Their common way is to strike deep into the earth, and there to spread every way to a great distance. This is their natural course, and in this they should be encouraged. In an old hop ground the roots have gone their depth, and they cannot spread because of the hardness of the earth between. The mould in the hills is all they have any advantage from, and that is renewed too superficially. In this case the hop sends its roots but a little way, and they lie in an earth they have long before exhausted. This is the occasion of their decay. By removing them into a new ground, the same plants succeed greatly, nature therefore is not exhausted in them. We have shewn how they come to lose their vigour: and we have said at first, that at such time the common practice is to set them in a fresh ground.

We have set this plain state of the case before the planter, to shew him that this is the wearing out of the ground; and as we are about to propose the renewing it by tillage instead of giving it up, we shall shew the reasons. We have advised planting the ground with fruit trees in time: so that the person who chuses to give up his ground at the end of ten or a dozen years, may do it to the best advantage: but we here shall give him the choice of restoring it to its vigour, and continuing it in strength from generation to generation.

## C H A P. XX.

### *Of restoring a decayed hop ground.*

**I**N the condition wherein we have described the hop ground, the common practice is to give it up; and this was reasonable upon the old footing of agriculture: but now we are upon a new and better system. On taking up a root of an old hop plant in one of these decay'd grounds, the fibres hanging from it will be found few in number, large, and often mouldy, or decayed at their ends. This is a state in which they can support the plant but poorly. The large roots in all growths serve to receive the nourishment from the small ones, and convey it to the rest of the plant; but 'tis the small ones that absorb it from the earth. There are few of these, therefore the others in a manner lose their use, and the plant is poorly nourished. There are no  
small



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small roots to penetrate into the earth; nor any ground in a condition to receive or supply them with nourishment. Therefore we must do two things: we must occasion the plants to send out more roots, and prepare the earth to give them free passage, and afford them nourishment. How we shall make the plants send out new roots, the practice of every gardener shews us. When he is to remove any plant, he cuts off the ends of all the roots: there immediately strike out a great many new ones; and these being small are in a condition to imbibe nourishment. The other article may be learnt also by the same familiar example. When the gardener has cut the roots, he opens a hole, and stirs up the ground about the place. This disposes the mould to give free passage to those new roots, and to afford them nourishment.

Let us apply the principles we have before delivered, and this familiar example to practice in restoring a decayed hop-ground. We say the earth is exhausted, but that is a mistake. All in the middle of the intervals lies hard and unpenetrated, and has done so for many years, no roots have got into this at any depth, therefore this is not exhausted. The earth about the hills being exhausted, is to be removed, and fresh and better matter is to be put in its place, and the others being thoroughly broken and divided by the four-coultered plow, will be ready to serve as new earth. In plowing the ground let the plow come as near to the hills as it can, and cut to the full two spit depth, particularly in those places. This will cut off the ends of all those roots which shall have penetrated so far within that depth, and the ground being rendered light and fine, will be ready to receive freely the new roots they shall shoot from their ends, and to afford them nourishment. In the same manner the spade will, in digging down the hills, cut off the decayed ends of those shorter roots which never extended beyond the hill; and a perfectly new earth will be added here for them to strike into, and for the supplying them with nourishment. Thus the roots will be nearly all cut off at their ends: they will be put in a condition to send out new ones; and there will be earth about them to receive and supply them with nourishment; and this is all that is required for the most perfect growth.

We see therefore that a ground thus treated ought to yield as well, and indeed better than a new one, because of the established growth of the sets: and I may almost venture to affirm, that it will answer exactly so in practice. What I am proposing to others I have tried myself in little; and am now practising at large. I mended one corner of my ground in this way, and it answered to the utmost expectation: I am repeating the same



course in the whole ground, and have no reason to doubt but the success will every where be equal. When the ground is once restored this way, the common horsehoe or hoe plow, called the horse-break, is fully sufficient.

## C H A P. XXI.

*Of watering a hop ground.*

**T**HERE remain some few particulars to be mentioned, as to the management of a hop ground. The principal of these is watering. It is not necessary every year; and happy for the planter that it is not, for 'tis a business of great fatigue: but sometimes, whatever be the expence or labour, it will be found worth while to do it. This depends upon the seasons. When nature follows her usual course the planter need give himself no trouble to assist her; but he is to know what assistance she should afford, and when that is wanting he is to help her by art.

Thus spring is a season in which there are showers, nature intends this, and all vegetables require it: but there are seasons in which the course of nature is interrupted: in these let the planter in the hop business assist her at whatsoever expence. No plant requires the spring rains more: some will do without them for the time, and recover afterwards when they fall, if ever so late; but if the hop be defrauded of its due watering in spring, it will be seen in the fruit in autumn.

We have observed, that in the choice of a piece of ground, the planter should fix upon a place where there is water near. The time of watering is a material consideration. It is not to the advantage of the hop to shoot early, because the plant is by that thrown in the way of many accidents. The first season for watering is just before the ground is pared, and the hills are made up. This will dispose the hops to shoot vigorously when it should; that is, when the hills are in a condition best to support their growth. If the season prove tolerably good, the trouble of watering concludes at this once; but if no rains fall in the following month, it must be repeated at the end of that time; and if the ensuing summer continue dry, it may be repeated once more about the time of the hops flowering. Nothing contributes to fill and perfect the fruit so much as a proper degree of moisture at the right seasons. A sufficient quantity of water is to be allowed: to do it slightly is not to do it at all: the planter throws away his expence, because he grudges to do what is sufficient. The hop is a large plant, and great supplies both of water and earth are to be given it, or it will never support itself to any advantage.

Every



Every time the ground is watered, let the spaces be pared afresh, and the parings added to the hill. The vapour of the water ascending through these parings, mellows and softens them, so that they become an excellent manure as well as shelter; and the weeds are destroyed by the same operation. Sometimes particular plants of the hop will succeed but poorly, or single hills will dwindle when the rest flourish. Let these hills be watered frequently with water in which pigeon's dung is mixed; making a basin round the plants, that none may be lost. If this does not succeed, let the hills be carefully opened, and some hog's dung mixed with rich earth, be put in about the roots. About November let the ground be particularly well dug round these hills, and they will equal the best of the others.

Having laid down the general method of managing the hop ground, we shall communicate to the publick certain improvements upon the common practice. They have come into our hands in the form of letters, from various persons.

# L E T T E R I.

*On the choice of ground, and manner of planting.*

S I R,

“ If the experience I have had in the hop-way is of any use, I shall  
 “ be glad to serve you. If you expect a good ground, let it be free  
 “ to the air. I find wherever the air can't get through, hops blast,  
 “ and in the middle of the ground they shall be all spoiled; at the  
 “ same time they are quite good at the sides. One great elm in a  
 “ neighbour's ground has spoiled me many a bag of hops, it stands  
 “ just where the air should pass; and there are two others behind it,  
 “ so that I am there quite choaked up: my hops for eight, ten, or a  
 “ dozen hills just there are many years spoiled, while all the rest are  
 “ in good order.

“ I find it inconvenient to have all my hops ripen at a time, for  
 “ there is no getting hands enough to manage them. For this reason  
 “ I now plant three sorts; the early white, the long-white, and the  
 “ oval. The first of these ripens a fortnight before the two others,  
 “ and the oval is commonly a week later than the long white. So I  
 “ have three seasons. The early-white don't yield a great crop, but  
 “ they come early to market, and fetch a price, so I find one thing  
 “ answers for another: and this I know, since I followed this way,  
 “ I have always more profit, than I used to have, and not half the  
 “ trouble. If others will do the same, they'll find the truth of what  
 “ I say.

I am, with respect,

Your humble servant,

ARTHUR COLLINS.



## LETTER II.

*On the planting and management of hops the first year.*

S I R,

“ Whereas it is the common way to plant four sets of hops in a  
 “ hill, one at every corner, I bethought me in planting a new hop  
 “ ground, to try practices, and plant more: in some I put twelve sets,  
 “ three on each side, in other some ten, in some eight, and in others  
 “ seven, six, five, and others four; in some also I put only three, and  
 “ in others two, and in a few but one plant a piece, sticking it just  
 “ in the centre.

“ By what I find after many years trial in this new-fashion'd hop  
 “ ground, our planters have not found out the right number. Where  
 “ I have only one hop in a hill, it bears full as much as two in the  
 “ common way; and where I have ten or a dozen, they starve one  
 “ another; and don't yield so much as four. Upon the whole, plac-  
 “ ing the hills at the common distance, each will very well feed six  
 “ plants, if the ground be well tilled between, and they will yield  
 “ every one nearly as much as one where there are only four. But  
 “ suppose the six thus yield as much as five, when there are only four  
 “ on a hill, still it is gaining a great advantage.

“ My single plants are liable to fewest damages, and the thickest  
 “ planted to most: but I don't see any material difference in that  
 “ way, between six and four on a hill. This I thought good to tell  
 “ for the benefit of others: depend upon it six plants in a hill is the  
 “ best number can be raised.

“ There is one thing more it may not be amiss to tell you of. We  
 “ have a way here of losing the first year of a new hop ground, hav-  
 “ ing a notion that to let the plants bear the first year, weakens them  
 “ for ever afterwards. I'll tell you how that is. If the ground be  
 “ planted in spring, as some do it, then there is so little time between  
 “ that and the hop season, that there will be a small produce: but the  
 “ right season of planting is the beginning of October, and in that  
 “ case the sets root before the cold of the winter, and have time to  
 “ strengthen themselves in the ground for the spring shoot. They  
 “ will therefore come up strong, and as well as some spring-planted  
 “ hops the second year. In this case they will yield a very good pro-  
 “ duce the first summer, and it is a very idle and wasteful thing to  
 “ neglect gathering of them. I have found it thus in many other  
 “ things concerning hops: people follow one another's practice  
 “ right or wrong, without considering that what is right in one re-  
 “ spect, may be wrong in another.”

I am, Sir,

Your humble servant,

## LETTER III.

*On the picking of hops,*

S I R,

“ I have found many inconveniencies attending the usual way of  
 “ picking of hops in the open ground, for which reason I have no  
 many



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“ many years built a place for that purpose. I am sensible the name  
“ of building is enough to startle people not used to these things, but  
“ mine is only a shed: the cost very little, and the convenience great  
“ on many occasions. My shed is only a top, two ends, and a side,  
“ being open all the length one way; and the materials are of the  
“ cheapest kind. The length is two and twenty foot, and the breadth  
“ twelve. This conveniently holds two frames in the picking season;  
“ and at all other times it serves to house the tools, to put by  
“ any thing like to be wanted, and in winter to lay by the poles. I  
“ never have my poles above twenty foot long, so there is two foot  
“ over room to hold them.

“ In the picking season I set up two frames lengthways in the shed,  
“ and have just room for the people to sit back to back between them.

“ My frames are seven foot and a half long, and three and a half  
“ wide; they are made of nothing but four posts for corners, set  
“ up firm in the ground, with a hair-cloth tacked over them, and a  
“ couple of forks to hold up the poles. The poles are laid over  
“ these, with the vines upon them, and the pickers work along  
“ the sides, and at the ends, picking the hops into the cloths.

“ Thus I find no damage nor danger from wind, sun, or showers,  
“ and my work in every respect goes on better than my neighbours.

“ Many of them make the same sort of frames that I do, remov-  
“ ing it from one part of the ground to another; but I have always  
“ found the fixed shed best, and mine are not small grounds. The  
“ poles are ready to be laid up, and there is no danger of accidents.  
“ My hops are picked clean and dry, and they are not after-  
“ wards broke by tumbling about, for it is only taking up the ends  
“ and sides of the hair-cloth, and they are carried away as it were in  
“ a bag directly to the kiln, where they are emptied into the bed for  
“ drying.”

S I R,

Your very humble servant,

R— R—.

### C H A P. XXII.

#### *Of flax.*

**T**HE value of flax is encreased by the easy manner in which  
it is cultivated. Scarce any produce may be made to  
bring in greater advantage, and none is so much neglected.  
We import from abroad at a great price, what we might raise  
as well at home. We have laid down in the preceding chap-  
ters, the method of managing hops: an article of difficulty,  
which yet in many places is executed with great familiarity: and  
we hope, from the light wherein we have set it, that it will be  
so in many more. What we have to say of flax, though  
we shall deliver its management as fully, will be comprized in a  
smaller compass, and the trouble of the person who shall be in-  
duced to raise it, will come in a much smaller and shorter  
way.



Flax is a slender, tall, and pretty looking plant. It is too tender to keep itself well upright singly, but in a field where it is sown together in a body, nothing stands better. Flax is an annual plant. Its root is small and fibrous; the stalk is smooth, and it rises to three or four foot in height. The leaves are small and narrow, and of a pale green: the stalk grows strait and single to the top, where it divides into three or four little branches, and on these grow the flowers, and after them the fruit, containing several seeds. The flowers are large and blue. Each flower stands in a small cup, made of five pointed leaves: the flower consists of five leaves; narrowest at the bottom, so that the whole has the shape of a funnel. In the center stand five short filaments, each having at the top a knob or button, shaped like an arrow's head; and in these is the young fruit, on which grow five very short and small threads, bending at their tops, and having no knobs or buttons on them.

In the hop those small knobs on the filaments, contain a dust that impregnates the fruit, and perfects the seeds; they are of the same nature in all other plants, but in this, as in most, they stand together with the rudiment of the fruit, in the bottom of the same flower: whereas in the hop, and a few others, they grow in different flowers upon the same, or upon different plants of the same species. The husbandman will not be displeased that we thus inform him of the nature of flowers; we would have him ignorant of nothing that relates to his profession, and this is no idle curiosity: he who best understands plants, will best raise them. When the dust from these buttons has shed itself upon the crooked filaments which stand among them, and which rise from the young fruit, the leaves of the flower fall off. Although they are the gaudiest part of the plant, they are of no other use than to defend these threads from injuries, while their dust is ripening. The threads also fall off, and as in this case of the flax, so in all others, nothing remains but that rudiment of the seed-vessel: this increases in size, and when ripe, is of a roundish shape, marked with five slight ridges, and terminates in a point. It contains ten cells, in which are the seeds: these are of an oval pointed form, smooth, flattened, and brown, and there is only one of them in each division. This is the herb which affords our linnen. It has been known in early ages, the Greeks having called it by the same name, and used it to the same purposes: and it seems to have been originally a native of some of the Eastern countries, tho' it is not easy to trace the time of being brought into the north. At present 'tis cultivated in most kingdoms, and deserves to be much more so in England.



C H A P. XXIII.

*Of the several kinds of flax, and the choice of the seeds.*

**T**IS one thing to speak as a botanist, and another as a husbandman: the curious in plants reckon twenty kinds of flax, but the farmer needs to know only one. The flax just described is the only one raised any where for use. We see a kind of flax wild about the borders of fields in some places, and it has been distinguished as different from the other, but it rises from seeds of flax scattered by accident, and only differs in being smaller and weaker. In a crop of flax a great deal will depend upon the goodness of the seed; and this ripens poorly for a continuance in England.

Most of our neighbours import the seed of flax from Flanders: but it is better to get it from the east. Every plant has its native ground on which it rises to the greatest perfection: its ripening the seed is the compleat perfection of its growth: and this will be best done where it is native. It is natural to suppose flax originally came from the east, and it no where ripens its seed so well. For this reason we advise to get the first seed from the Levant. Enough of it is imported every year, only let him take care to enquire for the right sort, and to deal with a person of integrity. When he has once a quantity of this, it will be sufficient for some time: the seed of his own growth raised from this will be good three crops, if it ripen favourably, but by that time he will find it run weak, and he must have a fresh parcel from the same place.

C H A P. XXIV.

*Of the proper land for flax, and the preparing it.*

**W**HEN the husbandman has his seed, he is to consider on what parcel of his land to sow it. To raise it to advantage, it must have the best ground that can be given. Flax, though a small rooted herb, exhausts a vast quantity of nourishment. Insomuch that it will impoverish the richest piece of land in a little time, but it very well pays the damage. The field to raise it to advantage, must have a light deep mellow soil, the more like garden ground the better, and it will never succeed so well as when it comes upon a new piece of tillage. A rich loam is most proper: and 'tis much the best to sow it on new broke up ground. The converting of pasture into arable, if the soil suits flax, is a very beneficial opportunity for sowing it: but it will succeed very well upon a broke up saintfoin lay; for the flax roots shallow, and the saintfoin very deep, so that the surface of the ground is left unexhausted. On such a field, flax



will yield a more profitable crop than any thing whatever; but to continue the benefit, he must change not only his seed, but his ground at proper seasons, for the same land will not, with any management whatever, bear many successive crops of flax.

Mr. Tull has said, that by his method of hoeing between the rows, one piece of ground will maintain the same kind of crop ever so long. Flax, whose culture probably Mr. Tull had not experienced, proves the contrary; no culture or management whatsoever, will enable the same piece of ground to bear crop after crop for several years. We do not give this as a proof that the new husbandry is not proper for flax; on the contrary, no crop whatsoever agrees better with it; nor is this to be raised any way with near the benefit that it is by the drill and hoe plow; but still the same land will not continue to yield it well. Half a dozen crops are the most that can be got from a good field by this method: and it is not easy to get more than four by the common husbandry. After this the field must be well manured for preparing it to raise some other crop, and the next sowing of flax is to be upon some other ground.

The new husbandry is better than any other method; but it does not come up to all that has been written of it.

The farmer has his seed of the right kind, and has fixed upon the piece of ground where he will sow it; the next thing then is to prepare for its reception. The great points here are two. To break the earth very fine, and to keep down weeds. We suppose the piece of land to be new broke up, it is to be wrought over several times, to reduce it to the needful fineness, and the flax will never thrive so well as if it be sown on land laid as level as the border in a garden. Let the ground have the last working about the third week in March, and then let the seed be sown. There are two ways of doing it, that by the drill and by hand: on the former we shall be more particular, because we have experience upon a trial, which perhaps no others have made in this kind.

#### C H A P. XXV.

##### *Of the sowing of flax.*

**F**LAX may be raised in very good crops by the common method, but experience shews it may be done much better the other way. The great damage to flax is by weeds; and these can no way be destroyed so perfectly as by the horsehoeing method. The reason weeds do so much damage is, that in the first shoot it is for some time very weak. In the common methods weeds rise with it, and being strong they get the better of it. This the persons who raise flax well know, but they do  
not



not know how to prevent it: they have tried many methods; but some of them have been fruitless, others prejudicial. It is for this reason we recommend the horsehoeing husbandry for flax, the success of which we have proved by trial.

As some may be bigotted to the old way, we shall lay down the needful directions for doing it in the best manner, according to that practice; and afterwards proceed to the other. If the farmer chuses to raise flax according to the old method, he must lay his ground even, with all the clods broke; then he must see his seed sown by hand, in the most careful manner, by single cast. This done he is to go over the land lightly, with a couple of fine harrows joined together. The time of sowing flax is the last week in March, but if the weather be cold it may be deferred till April. The flax will ripen for use if sown in the middle of April, but unless it be got into the ground early, the seed does not ripen. Weeds will grow up among the young crop; and the wetter the spring the more of them. We have shewn the damage, but what is the farmer to do, he cannot get in to hoe them up.

One practice there is in this way, which is the turning in of the sheep, but though it may be of service, it is capable also of doing great harm; so that it must be done with caution. When the rains of the spring have filled the flax with weeds, some have ventured to send in weeders, but their feet do more hurt than their hands can do good. The method of turning in sheep is better, but the time must be hit very nicely; if the flax be too low they will tread it down and destroy it; and if it be grown to some height, and the stalk firm, they will break it with laying upon it. There is a length of the flax at which it will not be in danger of being trampled in by the sheep; and at which it will rise again after their lying upon it. This is when 'tis about five inches high; and if sheep are turned in then, they will eat up the grass and weeds; and the flax, receiving little or no damage, will stand well the rest of its time.

This is the method of managing flax according to the common methods of husbandry, but it is hazardous and imperfect: the seed is sown at random, and there is great danger that in destroying the weeds the crop itself is spoiled. The same advantages are procured in a cheaper, and more certain manner by the new husbandry; and the method of raising it is this. The land is to be prepared as in the other method; and the seed is to be sown in treble rows by the drill, leaving the partitions seven inches broad between row and row, and the interval between every three and three as small as will admit the horsehoe or hoe plow. In sowing by hand, three bushels of



seed are allowed to an acre, when it is the fresh eastern seed, and all very fine and full, half a bushel less will do; in the drill way one bushel is enough for an acre, and the stalks rise more numerous, and grow tenderer and finer.

When the seed is in the ground let the husbandman prepare for hoeing. He is not so much to mind the shooting of the flax, as the rising of the weeds; and this is a season when they will be very speedy and very numerous. The crop should have all the nourishment the land affords: therefore these are to be destroyed in rising. Let the intervals be turned up with the hoe plow upon the first appearance of weeds; and this will answer several excellent purposes: it will destroy them; and at the same time prepare the earth to admit the roots of the flax freely, and they will be well settled in it in the midst of their proper nourishment, before any second crop of weeds can rise. When the flax has a little height, let hoers be sent in with hand hoes to clear the partitions. Thus the growth will have all the nourishment the earth can afford for its first shoot, which will be vastly stronger than it is to be obtained any other way. By these means the flax will get such a footing in the ground, before any other crop of weeds can rise, that it will be too strong for them. It would do without any more hoeing; however, there is no harm in repeating it by the hand hoe, in the small spaces; and as to the intervals the husbandman is to keep a watchful eye upon them, and to repeat the horsehoeing as often as he sees any parcel rise, that would exhaust the ground. No growth requires this assistance so much as flax, and the encrease in growth will very well pay the trouble and expence.

#### C H A P. XXVI.

##### *Of the pulling of flax.*

**T**HERE is a peculiar period at which flax is fit to be gathered: this must be watched, and the opportunity seized as soon as it offers. The use of flax is of a particular kind. Other crops are raised for their seed or their roots, but this for the stalk; and this will yield to the operations in dressing better or worse, according to the time at which it is pulled. In other kinds the ripeness of the seed, or the bigness of the root, are the marks for their being fit for gathering, but in this it is the due condition of the stalk. Those marks are visible and obvious; this is the more difficult to be known, and therefore it must be watched the more narrowly. Although the greatest part of his flax is to be pulled for the stalk, it is proper to let some stand for seed. This makes a different period of gathering: for if the whole were to stand till the seed was ripe, it would



would be of little worth. Let him first set off a part for standing for seed, and let this be upon the edge of his ground that is best defended from winds, and where there is most sun. If there be a part open to the south, and backed by a good hedge, this is the place. Let him mark out by stakes what quantity he will leave there for seed, and then watch the rest for ripening. This particular part is to stand till the seed vessel is dry and ready to open, and the seeds are full and firm. This degree of ripeness is easy enough known, so there needs no great care on that head; but before this he must look narrowly into the other.

It is a common practice to spoil the whole crop for the sake of the seed. The owners acknowledge, that if pulled while the seed is young, the flax will be the better, but the seed good for nothing; they therefore let it stand till the seed has just begun to ripen, and then pulling it the seed they say will harden and perfect itself in the drying. Those who follow this beaten path must see their flax out of flower, before they examine it for gathering: they must then watch when the heads turn brown, and begin to bend down the tops of the twigs whereon they stand, for that is just the time of pulling this way: but as the flax is sure to be much the worse for so long standing upon the ground, it is better to set aside a part only for the seeds, and pull the rest when it is in its perfection. We would lead the English raisers of flax, into this beneficial way. Our flax is inferior in its quality to that of many parts of Europe, where they have no natural advantages over us for its growth, but only understanding its management better: and the great article is their pulling it before it is too ripe.

In the east they sow particular spots with flax for the seed, chusing warm situations and the richest soils. This is one reason why their seed is so fine, their taking such perfect care in the productions of the seed plants, and nursing them up purposely and only for it. We confound the two purposes of sowing together, we will have our flax ripen its seed, and yet be fine in the stalk, which is impossible. In the Levant, and in those parts of the Low Countries, and every where else in Europe, England excepted, when they sow flax, they have their large fields raised for the stalk, and particular spots for seed. They can therefore pull one crop for use just when it is fit, and their manufacture from it exceeds ours both in strength and colour. Let us take the example, there cannot be any error in following the steps of those whom we see excel us in the same article. We have not directed their method of raising separate parcels for seed on distinct spots, it is sufficient that



our husbandman set apart a certain parcel of his common growth for that purpose. When the two considerations are separated, they will be both better understood. The husbandman is to let his seed quarter stand its time, but he must have an eye upon the other as it rises to flower. In the common method the flax flowers irregularly. Some of the seed having been buried deeper, and some shallower: also some of the seed lying single and at a distance, and there being heaps in other places, that also will make its share in the variation; for such plants as stand single will flower a week before those which are in clusters. From these causes a field of flax sown by hand, flowers irregularly, and this is a vast disadvantage in a crop which should be pulled at one exact time, and that determined only by the flowering.

This shews why the drill husbandry is better than the common for raising of flax: in that method all the seeds being let in at the same depth, and disposed with regularity, both the occasions of the difference in coming to flower are prevented. When the flax is raised singly for the manufacture, it is to be pulled as soon as it is in full flower, the proper time is before one flower falls. Let the owner watch its bud: when that bursts let him have his pullers ready, and as soon as all the plants are in flower, and there appears the first mark of fading in any of them, let the people be sent into the field. The more there are of them the better, for the benefit would be to pull it all in one day if possible.

The flax is an annual plant; the purpose of nature is its ripening its seed; and when this is done it perishes entirely. The use we make of the stalk is accidental, in respect of the plant's growth; and we are to seize the period accordingly. The article of value in the flax are the good colour, and the firmness of the threads in the stalk. These threads arrive at their perfection when the plant flowers. They have been gradually coming up to it before, and from that time they are gradually declining from it. That is the period of perfection, and at that they must be taken; in all things when perfection is attained, the next step is toward decay. While the flax is growing to its height, the threads in the stalk are green and tender; when it has arrived at its full stature they are white and firm, and as soon as that period is elapsed they grow brown and harsh. This period is short, and all depends upon it. Nature is not remiss in marking it, if we be not negligent in taking her instructions. The time of flowering is the exact period. Flax always flowers when it has arrived at its full stature; it never flowers regularly before, nor except by some accident de-  
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 fers



fers it longer. Till it is in flower the fibres in the stalk are green and weak; when it is in bloom they are white and strong; and when it loses the flower and is ripening the seed, they become harsh and brown. Whiteness and strength are the qualities we require in these fibres, therefore the period of flowering is the exact time whereat the plant should be gathered.

We see in all herbs that the stalks are weak and tender till they flower: they are firm and in their perfection when the plants flower, and they dry up and grow brittle when the seed ripens. Flax follows the course of other annual plants, and must be therefore pulled when the flower is just opened, in order to have it in the full degree of strength, colour, and perfection. When the pullers are sent in, they are to be as expeditious as possible in their work. The flax roots very lightly, so that the least touch takes it up, and this is the reason of the gathering it by hand in that manner. As they pull it up they must gather it into handfuls, and tying these together they must be set up in the field at distances one from another. In this condition they are to stand till they are thoroughly dry: the sun and air soon do this perfectly, and they grow firm but not harsh in the drying. As soon as perfectly dry the handfuls are to be housed, and they are then ready for sale.

#### C H A P. XXVII.

##### *Of the working of flax.*

**W**HEN the flax has been well dried after the pulling, the next operation is called rating of it; as to the housing the bundles, that is a matter merely of convenience. If every thing be prepared, and the husbandman manufacture it himself, he may take it directly from the field to the water; if otherwise it is housed, to keep it out of the way of harm. Rateing of flax is steeping it in water, in order to loosen its bark or rind. The thready part of the stalk is to be used, and the first thing is to separate the rind from it, that not being thready. The best manner of doing this is by soaking it in water: it is done thus. They lay the bundles in a shallow pond, dug for that purpose, putting some slight weight upon them to keep them under: and every other day they are to be turned.

When they have lain six days they are to be taken out, if the bark be sufficiently loosened. This is easily known by rubbing one of the stalks from the middle of the bunch between the fingers: if the rind part easily they have been rated enough, if not they must lie a day or two longer; but usually, at that season of the year, six days are sufficient, sometimes it is done



in five. When taken out of the water the bundles are to be spread abroad and dried; and they will thus be prepared for the brakeing. This is the second operation they go through, in order to being prepared for linnen. This is performed by a particular instrument made for that purpose, and called a brake. It is notched at the end or throughout, according to the various methods in different places, and with this the thready part is separated from the bark and loosened. The method is to begin at the root, and go all the way up to the top. When the flax has been thoroughly broke by this instrument, it hangs in threads and scattered pieces, and is then ready for the third operation, which is the swingling. This is a kind of beating, and is to be performed with an edg'd stick, called for that reason a swingle. This separates the fibres more, and it always lays them more regularly, and by this the flax is prepared for the fourth operation, which is the beating. The swingled flax is laid on a block, and laboured with a beetle, or it is put into a trough, and beat with a hammer, and this beating is continued till the whole substance of it is made soft and pliable. When the flax has been sufficiently beat it is fit to be hackled or combed. This is done somewhat in the manner of combing of wool, what are used for flax being called hackles. It is to be worked thoroughly through these, one after another, till all the short stuff is got out; and the long and fine fibres are made smooth, and lie evenly together in form of so many threads; in this condition it is fit to be spun.

This is the whole process in forming the stalk of the flax, gathered at a proper degree of maturity, into thread, and thence into linen; the whole is very familiar, and can admit of no misunderstanding. When any large work of this kind is carried on, there need be no grudging of the expence of implements; and where less, there are various ways of contriving to save money. In some parts of England all the trouble and charge of beating flax by hand is saved, by a particular structure of their corn mills: they make the axle-tree of the principal wheel longer than usual, and they place pins in it, which by the motion of the mill raise large hammers: these beat the flax in the manner of the hammers used in fulling mills. Many other contrivances in this way might easily be made, but the first point is to get people into a way of setting about the culture of the herb. Those who raise the flax for stalk and seed both, have a necessary operation which we have not yet named. That no information may be wanting for those who raise flax in their own way, we shall add the method of separating the  
seed



feed before the stalks are put to be watered. This is called ripling, and it is thus done. The flax being pulled when the seed begins to be brown ; when the bundles have stood up seven or eight days, and are pretty well dried, they are to pass thro' the ripple ; this is a kind of combing of the stalk. The ripples are made of wood, and have their teeth so close, that when drawn over the stalk they stick at the heads or seed vessels, and pull them off. The bundles are then to be put into the water, and these seeds not being yet altogether dry, are to be laid by in an airy room till spring, when the whole is to be thrashed in the common way, to separate the seed from the husks.

This operation, in some degree, prepares the stalks for rating ; but it is not necessary. According to our advice no regard is to be had to the seed of the flax which is raised for manufacturing ; and therefore the whole bundles, when they are moderately dried, are to be put into the water, where the leaves will fall off about the third day, and sometimes the stalks will be ready for their first dressing the day but one afterwards. The time of taking them from the water is one of the critical points in managing of flax, it must therefore be watched accordingly. When the bark will part, and the threads separate, it is fit for taking out, and that time should not be let slip. If this happen the third day there is no occasion for any more rating, and if it be not in this condition on the seventh, it must lie yet longer. The condition of the flax is to guide the workman, not any particular number of days.

## C H A P. XXVIII.

### *Of hemp.*

**A**FTER flax we are naturally led to hemp, these two species being raised for the same purposes of cloth, though flax be the finer. The culture of the plants agrees in many respects, though in their form and nature, excepting that single article the threadiness of the stalk, they differ extreamly. Hemp is a large, tall, bushy plant, of a rough aspect and irregular growth, but upright and firm. In flax, as in most plants, the male dust and the female embryo are lodged in the same flower ; but in hops the male dust grows in a kind of little flowers on some plants, and the female embryo on others. This is the case also with hemp, and from hence has arisen a distinction in this kind into sexes. The husbandman observing that from the same quantity of seed there rose two kinds of plant, though alike in leaves and stalk, the one bearing little dusty flowers and no seeds, and the other producing seeds without any obvious flowers,



ers, called these two kinds by the names of male and female hemp. But they called those plants which produced seeds the male, and the others the female. This was so contrary to nature, that the names have been changed; and are now given to those plants to which they properly belong, that with only flowers of this dusty kind being called male hemp, and that which has seeds female.

Hemp is an annual plant. The root is long, slender, divided into branches, and full of fibres. The stalk is thick, upright, ridged, of a green colour, and grows six or seven foot high. The leaves are numerous, and divided in the manner of fingers; or five separate leaves grow upon each foot-stalk; they are of a dead green colour, rough to the touch, and notched at the edges. In this male and female agree; the only difference between them is, that the male is the lighter and more delicate plant. The stalk is small, and it has fewer branches; and it is tenderer and more hollow. On the tops of this kind grow the dusty flowers, which are of a whitish yellow with a tinge of green. The other or female hemp is more robust, the stalk is thicker and more branched, and instead of these dusty flowers it bears the seed. The male hemp is by some distinguished by the name of summer hemp, and the female by that of winter hemp. The male comes to its ripeness a month sooner than the other, and yields the finest thread. The structure of the several flowers and fruit are curious, and worthy observation. In the male the flower is composed of five little leaves, pointed at the ends, and growing together at the bottom; within these stand five small threads, with each an oblong square button at its top. In the female there is a green husk of an oblong shape, which splits open on one side, and at first contains the rudiments of the seed, and afterwards the seed itself, for it does not fall off as these parts usually do. The rudiment is very small, and has two long points rising from it, sharp at the ends; the seed follows, and continues shut up closely in the husk.

Hemp was known to the antient Greeks and Romans. It is a native of the warmer climates: but where it grows wild in abundance, they cultivate it not the less in fields for use; for the stalk never has its perfection in the wild state. There is properly but one kind of hemp. We have mentioned already the difference of male and female, but they both arise from the same seed. There is an account in authors of a plant called Virginian hemp, which is large, and has leaves unlike ours, single, not fingered, neither does it produce its seed like it, tho' the course of nature in it has some resemblance. This grows  
in



in the salt meadows, and is called by some Acidna. There are also several kinds of a wild English plant called bastard hemp; but this is properly a sort of dead nettle.

C H A P. XXIX.

*Of the proper land for hemp.*

THE culture of hemp is one of those neglected articles within the province of the husbandman, by which he who will engage judiciously in it, will not fail to make very considerable advantage. We shall lay before him full directions for the management of his crop, and shall be happy if by spiriting up the industrious, we can promote a thing that will be not only useful to themselves, but to their country. The importation of hemp in various forms, is a reproach upon the English husbandry, for we are able to raise it as well as any of those from whom we receive it. In undertaking this article of husbandry, the first thing to be considered is the soil. For there is no growth whatsoever that so perfectly depends upon the nature of the land for success.

Hemp requires a deep, rich, light, and dry soil. In England we have more and finer loams than in any country whatever, and these are the kinds of land that best answer the purpose. One of our dark dusky loams in which there is a good deal of sand, and a large quantity of pure mould, will answer beyond any other soil; we have a great deal of this in Northamptonshire, Lincolnshire, and Buckinghamshire, and I have observed that it there runs very deep, often two foot and a half or three foot, with a good open loam at the bottom. This is the best of all grounds for raising hemp. It is a soil that will bear any crop; but the farmer will not find any that will bring him a greater advantage. There are soils particularly improper, as well as such as are fitted for this growth. The most unfit are cold clays: on these hemp can never thrive; it is a native of the east, where the soils are light and dry, it is therefore against nature to force it here, to live in a cold, tough, and wet land. The other soil, on which it succeeds poorly, is that on which it is too often sown; this is the deep black mould that lies in low pastures, and is always wet. The depth and richness of this would agree very well with hemp, but it is always too moist. A deep earth for the roots to pass every way, is one of the requisites for hemp; but warmth is the other: and this latter is so essential, that it will grow better in a poor land that is warm, provided it be deep, than in a very rich one that is too cold. For this reason sand is so essential an article in the soil for hemp. I never saw this plant thrive any where,  
where



where there was not sand in some considerable quantity in the ground. I am aware of an objection that will be made to this assertion, by those who have seen hemp cultivated in the lower parts of Northamptonshire; but I have seen it there, and have answered so natural, yet groundless, an objection on the spot. The land on which they raise hemp in this part of England, is a deep black mould, which has been of the moory kind; but by the perfect draining of the adjacent fens is now left dry and crumbly.

Hemp would not have grown here to any profit, while the land was wet, but it succeeds very well in its present state. I have often talked with the farmers who raise it here, and they have told me there was no sand in the ground; to convince them I have only waited for a shower of rain, after which the first eye that is cast upon the land shews it in abundance. The truth is, this is the richest loam in the world, there is a little clayey matter which holds it very well together, and serves to detain wet enough to keep it always moist, and yet not so much as to chill it: and there is a considerable quantity of middling brown sand: this warms and opens it excellently, but the body of the soil being a fine black mould, that covers both the clayey particles and the grains of sand, till washed off by rains. This is a particular soil, but it is not singular in that place: I have seen it in Lincolnshire, Warwickshire, and Leicestershire: wherever it is the farmer may be assured, if he will sow hemp upon it, he will have a very great return. I have seen the experiment of sowing hemp on gravelly and stony lands: the success has depended upon the condition of the soil in depth, and the degree of stonyness; if it be a deep loamy earth, with a moderate quantity of gravel or limestone fragments on the surface, nothing does better; but if it be gravelly to the bottom, or the stones be too large, it will not succeed.

#### C H A P. XXX.

##### *Of preparing land for hemp.*

**A** Field may be put in order for hemp, either by breaking up fresh, or manuring after other crops; but the former is the better way. In Northamptonshire they break up pasture ground, when they have opportunities: and in some of the counties where they have got into the method of raising the artificial grasses, they plow an old lay of one of them, and it always answers very well. Once I saw a piece of woodland first sown with hemp, after the stubbing up the roots, and moderately speaking, the crop was twice as large as I ever saw it on any other ground: the soil was very proper, deep, and loamy,



loamy, and it had lain in wood many years. Whatever ground be chosen it will require to be very well dressed; not that dung is so proper, for hemp does not succeed well upon it; but a right degree of tillage.

This recommends the horsehoeing husbandry, before all others, because that gives the necessary tillage, and omits either altogether or in great part the use of dung. When manure is used to a field designed for hemp, it will be better to chuse some other kind, and not dung; and to improve the soil by the lasting, rather than by these temporary additions. Land which has been bearing other crops is not so proper for hemp, as fresh. Hemp requires a great deal of nourishment; and these fields are exhausted by what they have borne. There is no way in the common practice to recruit them but by dung, and that hemp dislikes. Therefore fresh lands are better: but though the best they are not the only ones that will do. I write in these things from experience and observation: I have told the farmer what I have seen, I shall add what I have tried. I have made a piece of ground that has borne its third crop in the usual way, yield a very good produce of hemp by good tillage, without any addition of manure. Therefore it is speaking from experience as well as reason, to recommend the horsehoeing husbandry for this plant. Let the farmer take care that his soil be proper, and he may raise it at any time, or in any condition, only by a sufficient tillage.

This assertion is founded on fact, and it is the greatest proof I know of the truth of those principles on which the practice of horsehoeing has been established. Hemp requires a great deal of nourishment, yet it will thrive very well upon land so exhausted by its third crop, that it would have yielded nothing to any profit without a refreshment of manure; there being no manure at all added for the hemp, but the whole being done by tillage. This is a proof that tillage alone prepares the earth to yield nourishment to plants, for the hemp thriving shews that it has nourishment in abundance. And there has been nothing but the tillage to give it. If the land on which the farmer intends to raise hemp be new broke up, whether from wood or from natural or artificial grasses, all that he has to do is to render it sufficiently fine, and expose it a little to the sun and air; and then going over it once again to level it, and get in his seed: but if it be a field that has borne other crops, and is exhausted, he is to refresh it, by substantial manures according to its kind, as mud, sand, or the like; and then to break and divide it by repeated tillage. In this case, the oftener he goes over the ground the better, and the more variety of instruments he uses the richer he



will make it. Let him turn it up deep with a proper plow, and tear it to pieces afterwards with a harrow. Then, in a dry season, let him draw a heavy roller over it, to crush the clods; and when he has done this harrow it again, to break thoroughly to pieces what the roller only bruised. After this, let him give it rest for some time, that the sun and air may penetrate it well, and then begin by plowing again. Let this practice be observed throughout the winter, and in spring let him lay it level and even for his seed.

## C H A P. XXXI.

*Of the sowing of hemp.*

**W**E will suppose the winter dressings to be past, and come to spring, that is the season for sowing this valuable crop. Let the farmer take care that he get good seed. If he err in this respect, all his labour will be fruitless. Let him chuse such as is fresh, firm, and bright; and try it by rubbing it well between his hands. If it bear this without breaking, and look the finer and cleaner for it 'tis good, but if it appear dusty and broken it is old and damaged. Good seed being chosen, the quantity is to be determined, according to the method proposed for raising it. If by the common husbandry three bushels are to be allowed to every acre: if the drill and horsehoeing be followed, which is much best, a bushel and half of seed to an acre is sufficient.

The seed being ready and the ground dressed, the last operation must be preparing it for the seed; and this must be very carefully done. The first week in April is the right time for sowing hemp, therefore let him begin his last dressing accordingly. If the season be unfavourable, the sowing may be deferred a week, ten days, or even a fortnight without damage, but 'tis best when it can be done at the time just named.

When the farmer gives the land the last dressing, he must make it fine and level as the border of a garden; hemp-seed is tender, it will not grow unless laid in very regularly. It requires but a slight covering, and if it be buried deeper, it will never come up. If any clods be left in the ground they will fall over some of the seeds, and such will perish. I have seen the bad effects of carelessness in this article, and therefore caution the farmer the more strictly; in the common way of sowing not a third of his plants would come up; and one half of those will rise irregularly, and getting bad habits by twisting in their first shooting, will never come to any thing considerable afterwards. When the land is of a sufficient fineness let a careful seedman go over it with the seed, and spread it regularly over  
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the ground, by single cast, as evenly and equally as he can. As soon as this is done let the field be harrowed very lightly, and well defended from birds. There is no seed of which small birds are so fond as hemp: it is large and conspicuous, so that it attracts their eye, and it is to be slightly covered, so that they can easily get at it. Boys must be set to watch, and all imaginable care taken of it for several days after sowing, otherwise the farmer, with all his former cautions, will have but a poor account.

This is the method of sowing hemp in the common way of husbandry; and to what has been laid down already we have only one caution to add, which is, that the farmer who expects a good crop do not follow the practice of those who do nothing to their land till they are just going to sow. There are those who content themselves with giving it one plowing in spring for hemp: but by what I have seen they content themselves also with a poor harvest. Hemp in its nature requires a land better dressed than almost any other seed.

We are now to name the way of raising hemp in the horsehoeing method, which we have before observed is vastly preferable to the other. The preparation of the ground must be the same as in the other method, and the seed must be planted in double rows, with ten inch partitions, and with intervals just broad enough for the passage of the hoe plow. The seed must be planted very shallow. Hemp is a large plant, therefore it must not be set in treble rows, for the middle one wanting air would come to nothing. It succeeds very well in a single row; but experience shews, that in the double, with this interval, the plants grow as well, and the profit is much larger. This is the method of cultivating hemp to the greatest benefit.

#### C H A P. XXXII.

##### *Of the ordering hemp in its growth.*

**T**HE horsehoeing husbandry supplies plants with fresh quantities of nourishment during their growth. This is not more necessary for any thing than hemp, for the filling of the stalk depends upon it. 'Tis for this reason that we have so particularly recommended the new husbandry for this species. A plant raised this way will be often worth four in the common method. In that practice the hemp is left to itself, as soon as it is well out of the ground. The attendance is only required till the body of the seed is wasted. Birds will not meddle with it afterwards, and as to weeds they cannot live among it. 'Tis a quick grower, and a very strong plant; and in the way of sowing by the common method, the shoots will rise so near one another, that they will have enough to do to live well themselves.



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selves, 'till they begin to pierce with their roots to some depth ; and neither then nor afterwards, will they suffer any thing else to live among them. Hemp is so far from being in danger from weeds, that it is the best thing that can be sown for preventing them for the future. Nothing clears a land so thoroughly as a crop of hemp ; but then it exhausts the ground so thoroughly, that it leaves it fit for little else without a great deal of preparation.

The two great advantages of horsehoeing husbandry, are destroying weeds and furnishing nourishment while the crop is growing. For the first purpose hemp does not need its assistance ; but nothing requires it more for the latter. If hemp satisfies the farmer in the common way ; it will enrich him in this ; for every plant will speak for itself in the praise of this method. When the seed is let in by the drill, the danger is not so great from birds and other vermin, because it is all covered ; but this is not a sufficient security, one seed that shall chance to lie naked will tempt these devourers : therefore it is to be watched. The time of the birds feeding upon the seeds is principally before sunrise, therefore the ground must be carefully watched from break of day : after this they are less ravenous, till towards evening, when they feed again, till within half an hour of sunset.

When hemp has four or five inches height in the shoot, the weeds will begin to fill the intervals ; and some, though not many, will rise in the partitions. Let the farmer send in careful labourers with hand hoes, to cut down those in the partitions. Once doing this will be sufficient, for the hemp gathering strength will not permit them to get up any more. The hoers should also pull up here and there a plant of the hemp, where they have risen too thick : but this is an article in which they must be sparing, for the working of the intervals between will render the ground capable of supporting the two rows of hemp, with the plants closer than can be well imagined. When the weeds are cut down by hand in the partitions, let the horse hoe be brought into the intervals, and with this let all the ground between the pairs of rows be turned up deep, and broke fine. The weeds will be destroyed by this, and the whole soil made fit to receive the roots, and filled with nourishment to support them. The effect of the horsehoeing is in no case seen more perfectly or plainly. The fibres of the roots of hemp, even in the most favourable soil, do not naturally spread, but lie in clusters about the base of the stalk, their number answering for their shortness. But in this way of horsehoeing the fibres of the two opposite rows will meet across a five foot interval



terval visibly, and fill all the space between ; this is plain to the eye in examining the roots, and the flourishing state of the plant confirms it. The horsehoeing must be repeated as often as the weeds appear in these large intervals ; for no more, after the first, will rise in the partitions. The ground will thus be every now and then cleared and enriched, till the time of pulling the crop.

C H A P. XXXIII.

*Of the pulling of hemp.*

**L**A M M A S is the season of the first hemp harvest. There are two gatherings of this plant in every ground : the male and female, which rise together from the seed, differing in the time of ripening. This makes a particular article in the management of hemp. We have mentioned the season of the male hemp, which is called also the summer hemp, and by some fimple hemp, ripening. At this time let him keep his eye upon the field, and observe when he sees the leaves beginning to hang and turn yellow. He will perceive this when once it has begun, spread quickly through the field, but only upon the male plants. About the time of the leaves drooping and growing yellow, the stalks turn whitish : and this is the signal for gathering : no farther care is needful. This kind bears no seed, so that there is no second consideration as there is in the other. When the male hemp has got into this condition, the pullers are to be sent into the field. Hemp is gathered like flax, by tearing up by the roots. But here there is a great difficulty. The flax is easily enough pulled up, because it is all to be pulled : but in the hemp it is only a part : and it is not easy to do this without damaging the remainder. When hemp has been sown in the common method, all the owner can do is to caution his pullers not to trample down, break, or otherwise injure the female hemp that is left standing ; but with his best instructions, there never fails to be a great deal of mischief. In this respect, the raising hemp by the drill and horsehoeing husbandry, in the method of double rows, has a vast advantage. The intervals between two and two rows are so wide, that the pullers can easily and freely get in between them ; they can take up the male hemp without the least damage to the female, and they have room to manage it and get it up into bundles.

The first pulling being over, the remainder of the growth is to stand till Michaelmas. It thrives the better and the faster, because of being thus thinned ; and the time of gathering it coming in late, after the other harvest work is over, is happy for an industrious poor, in the places where it is propagated.



The gathering of the male and female hemp is to be done in the same manner, except that there is to be a difference in making up the bundles. Each kind is to be bundled up as flax, but the male hemp is to be gathered into small, and the other into large ones. The male hemp should be gathered up into such bundles as may be grasped with both hands, but the female hemp is usually got up into such as are a yard round.

## C H A P. XXXIV.

*Of the drying of hemp.*

**I**N hemp of the first gathering nothing is to be minded but the drying it in a proper manner, to fit it for farther working; but in the female regard is to be had to the seed. The time of making the second gathering is determined by the ripening of the seed: and when gathered and bundled, these bundles are to be set up in the sun four or five days, and then stacked: that at a proper time the seed may be thrashed out before they are fitted for farther manufacture. It is the common practice to raise this hemp in stacks, in some sheltered part of the field; but as the beginning of October is usually a dripping season it is better to house it. A little wet does it no harm as to the main article of the stalk, but it may easily get damage in respect of the seed. The caution we have given, that the hemp which is to remain be not hurt in the first gathering, will be easily seen to be worth his serious consideration, when he comes to thrashing his female hemp. From the produce of an acre of good land he will get three quarters of seed, if he have followed the common husbandry in raising it; but if he have done it in the horsehoeing manner he will have four or five quarters, sometimes more. This sets the female hemp a great deal above the male in value, and the stalk is much more valuable in the female.

## C H A P. XXXV.

*Of the watering of hemp.*

**W**HEN the male hemp is gathered nothing is to be done but drying it, before it is carried to the water. The common practice is to bundle it up as it is pulled, and set the bundles up an end till the moisture is somewhat evaporated. This is all that can be conveniently done in the common way of husbandry, because there is no ground for spreading it; but in the horsehoeing method, as there is space between two and two of the rows, it is best to throw it upon the ground as it is pulled, and let it lie a day and night; and after that to gather it up into bundles. The male hemp, as soon as it is a little dried from the gathering, and the female, after the thrashing, are to be



be carried to the water in their proper sized bundles. A large shallow pond is best: and it should have a firm bottom: running water would answer better: but it is not permitted any where to use it, for the hemp infects it, destroys the fish, and spoils every thing that is done with it.

Let the farmer therefore who is raising hemp take care to have a pond of proper depth and dimensions ready, according to the quantity. He is to prepare for the hemp by driving in half a dozen stakes in a square form, very firmly into the bottom. Then the hemp is to be laid in, keeping it under water; and the small ends of the bundles are to be placed interchangeably, the thick ends of one bundle being laid one way, and the thick ends of the next another, and so with the whole parcel. In this manner the bundles are to be laid in, one upon another, and the water is to cover them all. When they are all in there are to be over-layers, as they call them, of wood bound to the stakes, to press them down, and keep them not only under the water, but fixed from stirring about. Some cover the square within the stakes entirely with over-layers of wood; others only cover the edges with these, throwing great stones or other heavy rubbish, to keep all under water. Whichever way the hemp is kept constantly under, 'tis all one. When it has lain five days, one of the upper bundles is to be taken out and washed in another part of the pond. In this washing the farmer is to observe whether the leaf comes freely off, for if it does the hemp is watered enough, if not it must lie longer. When it is watered enough, the bundles are to be taken out one by one; and washed in other parts of the pond, that all the leaves may be got off, and any filth or other matter that may by accident be got among them, may be discharged. The clean stalks are then to be set up an end, that the wet may drain from them. When they are drained, they are to be set up against a wall or pales, exposed to the south sun, that they may thoroughly dry.

C H A P. XXXVI,

*Of the brakeing of hemp.*

**T**HE hemp when dry is ready for the brake. This is a wooden instrument made with an edge, and in all respects like that used for flax but larger and stronger. This is the case with all the instruments used in dressing of the hemp. The effect of this dressing is, that the bark or rind is separated from the stringy part of the stalk, and that is broke and prepared for farther manufacturing. The thorough drying of the hemp is necessary to the doing this well, for otherwise the bark will not separate, nor the threads come to pieces; and the dryness of



the weather is a great advantage, wherefore this should never be set about but in a favourable time. If the season have been dripping, and the hemp could not be got thoroughly dry by the method already directed, it must be done by the assistance of fire: but there is great caution necessary; for hemp easily takes fire in the drying. So many accidents of this kind have happened, in places where hemp dressing is carried on, that every one ought to be vastly upon his guard who ventures it.

In some places they raise a kind of frame for this purpose. They drive stakes into the ground at proper distances, and lay hurdles over them at five feet from the ground: they then spread the hemp thin upon these hurdles, and make a small fire underneath. This requires good watching, but as a little heat does for the hemp it may be conducted without danger. The expence is trifling, and it makes it work much the easier. The method of brakeing is the same in hemp as in flax, and the purpose is the same, the preparing it for farther dividing. It must be begun at the root end, and broke up to the top; and the person who breaks it must look into his work at times. The design of brakeing it is, that the stringy part of the stalk may be all thoroughly crushed and loosened. When this is done, and it hangs in shivers, it is enough; if otherwise it is to be broke more. Let not this be slighted: the whole management of hemp is very easy, but it must be conducted with care; for a mistake in this respect can never be mended afterwards, without difficulty, waste and loss.

#### C H A P. XXXVII.

##### *Of the dressing of hemp.*

**T**HE brakeing being over, the next operation is the swingle. As to the brakeing, some perform it at once, which is the better way, others go over it twice: this takes up time, and with good management is not needful. When the hemp goes through this operation twice, the brakers are of two kinds, one coarser the other finer, and it is first broke in the one then in the other; but if a brake of a middle degree of fineness be carefully used, once does it, and it will be fit for the swingle without any more trouble. The swingle of hemp, which is the first dressing after the brake, is performed by two instruments, a block and a dagger. The block is made of a single deal raised four foot above the floor, and supported strongly to keep it steady; the dagger is a wooden one, of the form of a broad large dagger with a blunt edge. With this the hemp is worked upon the block, opening and beating it till all the knot-  
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ty pieces and shivers are entirely broke, and the whole is smooth and even.

The parcel of hemp brought to the brake together, is called a strike: this they also bring to the swingle together, and when they have sufficiently wrought it, they strike a fold or twist in the middle, which is the thickest part, and so lay it by, proceeding with the rest.

This swingle is a very useful operation, and must be done carefully: the more so because it prepares the commodity at once for the market, if the owner chuses to part with it in that condition. There are two things to be done in the swingling, the one is the breaking out the lumps and shivers, and the other is softening the thready part, which is very well effected by the swingling, provided that be done carefully. If the owner chuse to part with his hemp in this state, he has no more to do but carry it to market; but he may more profitably prepare it farther. The next is a second swingling. This is done in the same manner as the first, and works it finer. The first swingling beat away the lumps and soften the threads; this second divides them finer, lays them smoother, and prepares it for heckling. When the second swingling is over, the strikes are divided into dozens and half dozens, and made up into great thick rolls. These are spitted upon long sticks, and hung in a chimney, or in the way of some other gentle warmth. They must be dried in this manner till there does not remain the least damp or moisture in them; and they are then fit for beating. This is to be done in a deep and strong trough, or upon a block hollowed at the top, and the beetles must be large and heavy. By this operation all the threads are rendered fine, clean and tough. When this is done the strikes are to be divided, and all examined, to see if the whole be beaten enough; frequently some are not, and these must be beaten again.

When the hemp has been twice swingled, carefully dried, and well beaten, it is to be brought to the heckle. This first heckle must be coarse, and have very open teeth. From this heckling there will come some coarse parts, which neither the swingling separated nor the beating subdued; these are to be laid aside, and the hemp that has gone through this first coarse heckle is then to be worked in one that is finer. This prepares it for working into cloth the usual way: but when it is designed for linnen of particular fineness, there is some difference in the management; and this may be worth the farmer's notice, whether he intend to work it into cloth at home, or design it only for sale in the strike or heckle. Two dryings are convenient on this occasion, that is, when it has been dried and beat, and  
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once heckled, it is to be rolled up and dried over again, and the beating and heckling repeated in the same manner: after this the heckles designed for flax are to be used instead of those for hemp; these being coarser and not so fit for the fine work, even in hemp.

## C H A P. XXXVIII.

*Of managing the hurds.*

**W**E have mentioned the separating the coarser part of hemp in dressing. This coarse and knotty part is called the hurds, it is not to be wasted; but being laid aside in the dressing of the other, is afterwards to be managed by itself. In the first swingling of the hemp there will be separated from the finer part a great quantity of refuse, with tops, knobs, and half broken pieces. All these must be shook up together, and carefully dried. When this is done they are to be threshed with flails, and by this means the lumps will be broken, and they are to be laid by: they serve for many coarse purposes, though they would never have broke or divided well with the finer stuff. These, by way of distinction, are called the swingle-tree hurds; though any of the refuse may be beat up among them: a great care of the owner being, that nothing which can be put to any use be wasted. When the farmer dresses the hemp farther, there will be more hurds separated in the second swingling, and they will be of a better kind; these managed by the wool cards, make what is called hempen harden. They are not to be mixed with the other hurds, for they are much better, and sell at a better price. Every succeeding operation for the dressing the hemp separates a quantity of hurds, though it be every time smaller. These are all to be laid by as they come out. They do not require thrashing in the manner of the coarse first hurds and refuse; but being well managed with the cards, they make so many sorts of saleable stuff at different prices.

## C H A P. XXXIX.

*Of woad.*

**W**OAD is a plant of easy culture; subject to few accidents, and of ready sale. 'Tis pity therefore it should be cultivated in so few places. One recommendation it has in which it exceeds any growth, it yields three, four, five, and sometimes six crops in a year. It is a large plant, with great blueish green leaves, branched stalks, and multitudes of small flowers, followed by little pods with the seed. The root is long and cover'd with fibres. The stalks are thick, round, and upright, and they divide into several branches. The leaves



leaves stand irregularly, and many very large ones rise directly from the root. The flowers are of the shape of those of turnips, and the seed is oval. The flower is placed in a little cup, consisting of four oval colour'd leaves: it consists in like manner of four leaves disposed crosswise. There rise in the middle six filaments, four of these are of the length of the leaves of the flower, and two are shorter; they have oblong buttons on them, placed sideways: in the center of these stands the rudiment of the fruit. It is oblong, sharp on both sides, and is no higher than the two short filaments; the flower and it's cup falling off, this ripens, and contains only one seed, which is lodged in the center.

There are several kinds of this plant brought for curiosity out of different parts of the world, but only one is worth the farmer's notice, this is the common or broad leaved woad, called field woad. There is a kind with smaller and narrower leaves, distinguished by the name of wild woad. The seed of this is sometimes, by design or accident, mixed with that of the right sort, and of this the farmer should beware; this seed is somewhat smaller than the right.

#### C H A P. XL.

##### *Of the proper soil for woad.*

**T**WO articles in a soil favour the growth of woad, that it be dry, and that it be rich. When these happen together the ground is perfect for this plant; but seperately they will do. Any warm and dry soil will answer, though it be but poor, and in a rich soil woad will do, tho' it be not so perfectly dry as it must be in the other. What this plant affects most is a rich warm loam; and as richness and dryness are what favour it, cold and wet together will never fail to destroy it. Clayey soils will never do. This is the great caution. The next is, that be the soil what it will, the woad will not succeed upon it unless very deep, if there be a clayey bottom. This depends upon the same principle with the other, the hatred there is in this plant to cold and wet; for clay holds wet, and always makes a soil cold when it lies near the surface.

From these general hints the farmer may settle his practice in all the needful particulars. Let him avoid clays and clayey soils for woad, and when he is about to sow it in any other, let him examine the depth and the bottom. Woad is a large plant, and requires a great deal of nourishment, therefore it must have depth of soil: and particularly when there is a wrong substance underneath. If he have a sandy soil that is not bare and poor, but enriched with a large quantity of good mould a-

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mong it; this is excellent, and the deeper the better. If he have pure mellow earth to a due depth, this is better still; and in particular if he have opportunity of breaking up a piece of ground near some great town, where there has been a garden. It is worth his while to be careful in the choice, because the profits will answer. On favourable ground he will have one or perhaps two more crops in a year, than on others.

Woad, like other plants which require a great deal of nourishment, succeeds best upon a piece of ground that is new broke up: and in this case none answers like that which has been mellowed by dung and great tillage. If there be a piece of gravelly ground where there is not too great abundance of large pebbles, and a good deal of loam among them, this will do excellently. I have seen woad thrive very finely, where it has seemed to grow among bare stones; but there has been good stuff at the bottom. A piece of light limestone ground will also do for woad, with the foregoing restrictions, that it be not full of very large pieces of stone; and that there be some goodness and some depth in the soil.

Of all places in England where I have seen woad cultivated, the finest has been about Thorney in Northamptonshire. I had the curiosity to examine the soil in several of their fields, and found it all of one kind, it was deep, rich, and of a blackish colour; it consisted chiefly of mellow earth, but with a large proportion of a bright brown sand. What is more remarkable is, that the situation was low and subject to wet. The woad grows there in the way of more moisture than I have ever seen it elsewhere, and yet surpasses all other in the largeness and fineness of the leaf. This is a particular case, and I have inserted it as such, for the sake of the husbandman who may chance to have land of the kind of this about Thorney, but in general a somewhat hilly situation is best, and a dry deep soil.

We have observ'd that woad succeeds best upon new broke up land: the ranker this is the better the woad will thrive; it serves excellently to prepare such land for crops of corn, for which it would otherwise be too rich at first: but on all other occasions, as well as this, the woad is to be removed after a year or two. It exhausts the ground, and never succeeds well in the same place long together. The new method of husbandry might remedy that inconvenience, and perhaps with the assistance of a moderate quantity of manure, the same piece of ground might be made to bear woad ever so long; but this we shall mention more at large hereafter: the common practice of husbandmen is what we consider in this place; and that requires that the crop should be removed the third year.



CHAP. XLI.

*Of preparing the ground for woad.*

**W**HEN the farmer has fixed upon a piece of ground, his care is to prepare it for the reception of the seed. All plants that draw a great deal of nourishment, require the soil should be well fitted for giving it. The preparation is best given it by frequent tillage; and a careful and repeated breaking and dividing, and occasionally enriching of the ground. The best way of preparing such a fresh piece is, by turning it up first with the four coultered plow. This will cut and tear all the entangled roots of grass, and turn up the mould to a very considerable depth. After this plowing it should be harrowed carefully, and if the season and soil be both dry, it should be rolled, and then harrowed again.

This being done, the lumps broke, and refuse drawn off, there should be people sent on the ground to pick off the large stones, or any thing else that breaks in upon the evenness and fineness of the mould, and has escaped the teeth of the harrow. This is the custom in land that is most fit for woad, that is, such as is dry and warm: when it is a little moister the best way is to plow it in high ridges, and then the refuse that lies upon the surface, when picked off, may be thrown into the furrows to rot. Whichever method be followed, the land when finished for sowing, ought to lie as level, and be as free from lumps, as the border of a garden. Land that has been fallowed sometime does very well for woad; and I have seen it thrive excellently on a broke up piece after the artificial grasses: but in any of these cases the preparation must be exactly the same, and the reward will be suited to the labour and the care.

CHAP. XLII.

*Of sowing of woad.*

**T**HE preparation having been shewn, there remains to enquire into the time and manner of sowing. In each of these there is sufficient matter of choice to the husbandman, for neither the common manner of dispersing the seed, nor the common time of doing it are so proper as what may be advised. In the first place he is to take care that he buy good seed, and that he have enough of it: he is not to count that quantity sufficient which will do once to sow the ground. Woad is apt to fail, or to be destroyed early in its growth, he must therefore have a supply of seed to let in and make up the deficiencies. Having the seed and his land ready, he may sow it in the common way or by the drill. In the first method a gallon of seed



is enough for an acre, and in the drill method half that quantity is sufficient, for woad is large in its growth, and a few plants are enough upon the ground. In the common way, the seed is to be scattered as evenly as possible over the ground, by the single cast, and then harrowed in carefully. In the drill husbandry it is to be sown in double rows, with ten inch partitions, and with five foot intervals between two and two. Few crops are more difficult to be well managed in the common husbandry; but none easier in the drill and horsehoeing method. The leaves also grow much larger, and are in themselves much better, this way.

As to the time the common farmer errs as much as he does in the manner of sowing. The common season is the middle of February, but the proper time is the first week in August. Woad ripens its seed in the end of July; part of the plants are to be reserved for that purpose; and the seed never pushes so strongly as when sown as soon as fit for it. This is the course of nature. We see the seeds of plants ripening in August and September, naturally fall to the ground soon after, and they shoot in a few days: their leaves stand the winter, and all that time the root is strengthening itself in the earth; so that when the spring comes they are in a condition to shoot with strength and vigour.

This being observed in relation to woad, the growth will be much sooner fit to cut for the first crop; and every way better. This first cutting will be the richer for the time the roots have been in the ground, and the fresh shoots will be the more vigorous for the next: it will come ten days or a fortnight earlier in the season than it would have done from the spring sowing. The first shoots of woad are apt to suffer by insects: for this reason we have cautioned the farmer always to have a supply of seed to make up deficiencies; but the autumnal sowing is preferable; for it prevents them. When the seed fails in some part, and the crop is supplied by fresh, this is a little backward than the first sown; and when the fly has destroyed a part of the young plants, and more are sown; this last will be still more backward in growth than in the former instance. The husbandman would wish it should be all equal, that it might come all to be cut together; but this is not to be obtained, unless these evils be prevented. This is not to be done without a possibility of failing, but it may be made greatly more safe by the autumnal sowing.

I can speak from experience, that the seed sown in spring, is more subject to fail than that in autumn; and also that the fly or grub, is much more frequent in the former than in the latter season.



season. The goodness of the seed depends in a great measure on its being new. Seed sown in February must be seven months old, and it may be nineteen or twenty months. And it is always the worse in proportion. It is a common opinion among the woadmen, that two year old seed is as good as fresh, but nothing is more erroneous. They complain of bad crops, and 'tis strange they do not see into this, which is the principal cause. I have made some of them try the experiment, and out of twenty new seeds sown, not above one, two, or three have failed; and out of as many old ones, eleven, twelve, or more. I have found also by tryals, that out of twenty seeds of the same crop, sown a fortnight after their ripening, only two have failed; and out of twenty sown from the same parcel, the next February, four or five.

## C H A P. XLIII.

*Of managing woad in the growth.*

**W**E will suppose first, that the farmer has followed the old method, and sown his land in February by hand. In this case he will see it come up irregularly, and when it has been a week above ground, he must observe how it stands; if the grub or fly have been at work, he must send in a careful person with a dib in his hand, and a parcel of seed in his apron. With the dib he is to make holes, and into each hole he is to put five seeds; this is to be done wherever the young crop is thinned; and these holes are to be a foot asunder. If the farmer will sow his woad in spring, the earlier he does it the better. This plant will shoot in very cold weather, and the earlier the season the fewer there are of those insects: the warm showers of the more advanced spring bring them on in abundance. When the plants from this new sowing have got to a little size, the field is to be hoed. This is not only to be done to keep down the weeds; but to thin the crop itself, for the plants must not stand so close as they rise in this random way. The hoers must be careful: they must thin the plants to about a foot asunder; and they should leave the strongest and most promising. In this manner they will be refreshed as well as thinned; and having taken good root, and the present crop of weeds being destroyed, they may be left to themselves, for they will not suffer any more to rise among them.

Let us next examine the state of a crop sown in August. In this, if the seed have been the produce of that year, and the ground well prepared for it, there will be little or no need of examining it on account of deficiencies. The field will be too well covered to need a supply; and the flies will have little power.



power. At a proper growth, as in the former instance, the hoers are to be sent in, and they must thin the plants in the same manner as the others, and thus leave them for the winter. In that time they will make but a moderate progress above ground, but they will be all the while strengthening themselves at the root, which is the owner's true interest. They will be just strong enough to keep down the shoots of weeds, that shew themselves in that cold season, and they will grow apace into leaves in spring; affording an early crop, and a very fine one; and leaving the best foundation that can be for the next. From what I have seen practised by some particular woadmen, in this common way, I shall be able to give the farmer some useful hints. If he send in his hoers again in spring, to break the surface of the ground, and destroy all the weeds between the plants, this practice will greatly strengthen and refresh them. Not so much for the injury such a few poor starved weeds could have done, as for the advantage there is in breaking the surface of the ground. This superficial hoeing leads us from the common practice to the method we have proposed for raising woad according to the new; and to the advantages of deep hoeing about plants of so large a growth.

We have advised double rows and five foot intervals, because a third or middle row would want air, and therefore its leaves would never come to their due freshness and colour; and because the land between double rows should have opportunity of good turning. We will suppose a farmer to have ventured on this method, and shall not fear to promise him a three-fold success. The management of his crop is this: when the plants in his two rows have some bigness, he must send in the hoers with their hand hoes. These must clear away all the weeds in the partitions between the two where the horse hoe cannot come; and they must thin the plants in the rows. They must leave one every fifteen inches, or thereabouts; and these alternately, not opposite one to another. This will reduce the number of plants on an acre to very few, but the profit will be so much the greater. The benefit of woad is not from the seed but the leaf; and experience shews, that one single and vigorous plant will produce more and better leaves, than five that stand close and starve one another.

When the plants are thinned, and the weeds cleared away in the partitions, the horse hoe is to be sent into the intervals: this is to plow deep and turn up the soil; thoroughly destroying the weeds, and preparing the earth to supply abundant nourishment to the plants. As often as weeds rise in the intervals, this horsehoeing is to be repeated; and it will be best to use it also



at certain times, for the advantage of the crop in particular states. To understand this the farmer must consider the nature of the woad: its value is in the leaf; and that consists chiefly in its fine colour and great freshness. The woad draws nourishment apace while the leaves are young, and so continues till they get a good growth; but toward the time when they are to be cut, being large, they are not so fully supplied, partly because they require more nourishment; and partly because the ground is in a condition to yield less. We have shewn the occasion of this, namely, that all ground, from the time of its being first broken, and divided by culture, grows worse and worse till it is tilled again. Therefore when plants want most nourishment, they can obtain least; and this is particularly a disadvantage to woad, because its value depends upon the freshness of the leaf, which depends upon the quantity of nourishment it can get just at that time. For this reason let the farmer who raises woad according to the new method of husbandry, contrive his horsehoeings so that one of them may come just before the full growth of the leaf for cutting.

There is a time when the leaves of woad have acquired their size, and want only their fullness and colour: at this period let him bring in the horse hoe between the double rows. The earth will by this be filled with nourishment. The ends of the roots of the woad will be cut off, and new ones will shoot from them into the fresh mould: thus in two days the crop will acquire a new aspect of the true fresh green colour; and if ten days after this horsehoeing it be cut, it will be in the utmost perfection whereof it is capable; and the young shoots that are to rise for the succeeding crop, will shoot with great vigour immediately afterwards. From this it appears, that though a crop of woad may be every way advantageous to the farmer; it can no way bring him nearly so large a profit as when it is raised by the drill and horsehoeing husbandry. This practice is useful for all plants, but most for the largest.

## C H A P. XLIV.

*Of the gathering of woad.*

**W**E left the farmer with his field sufficiently stocked with plants, but not over-burthened with them; and free from weeds. They were in this condition capable of overpowering the weeds in the common husbandry, and proper directions were given for destroying them by the horsehoeing: therefore the farmer had only to wait their growth, for gathering his first crop. At what time of the year this shall happen cannot be well determined, for it differs according to the man-



ner of husbandry, and the time of sowing ; and also in some degree in respect of the moisture or dryness of the season. Woad sown in autumn will be fit for a first cutting, earlier than that sown in spring ; and that raised by the drill and horse-hoeing husbandry will be ready to cut earlier, and yield the second crop quicker than that managed according to the vulgar practice. For the rest, as the season is better, the crop will be the sooner ready. As warm and light soils are most suitable to woad, so a warm sun and light showers raise it the quickest to maturity : therefore the season will often make ten days, a fortnight, or sometimes more difference in the ripening of a crop of this plant.

Let the owner, when it comes near ripening, watch it carefully ; for on finding the exact time of this depends a great deal of the advantage. When the leaf is full sized, firm to the touch, juicy, and of a fresh and fine green, it is ripe : and as soon as it is, that should be done. Nature changes swiftly, from perfection to decay ; and in nothing more than in this growth. If the time of ripeness be not seized, the leaf presently begins to fade, it first grows flabby, and then loses by degrees its colour. This first accident is very hurtful, but the other worse. The letting woad stand three or four days too long, will reduce a very good crop to the condition of a very middling one. When the leaf is ripe let it be instantly cut. As soon as cut it is to be sent to the mill ; and the farmer is to prepare for his second crop. Woad yields several in a year. In the new husbandry the assistance of the horse hoe is so great, that these are all nearly of equal value, and at the same time there are more of them in number ; but in the common husbandry every succeeding crop is inferior to the first, both in quantity and goodness. The woad of the first and second crop are sometimes mixed together ; but those which come after must be kept separate, or they will much reduce the value of the whole. As to quantity, in the common husbandry, an acre usually yields a tun ; but in the horsehoeing method there is no doubt of its yielding a much larger store. Woad will stand some time and yield successive crops, but it is not advisable to trust the old roots too long : 'tis therefore to be renewed after the second year, with all the care that we have described as necessary at the first sowing.

## C H A P. XLV.

*Of renewing a field of woad, and of obtaining the seeds.*

**I**T is the course of nature in the generality of plants, that the large leaves which rise from the root, fade when the stalk grows up ; therefore, as these leaves are what the farmer wants  
\*  
from



from this use, he is not to encourage or suffer the growth of a stalk if he can help it, in the ordinary course of his crop: but when he wants seed he must promote this in certain plants; that he may have seed in sufficient quantity for his future occasions. We will suppose him to have gone through the first summer; what remains of the two years produce will be easily understood, as to its use and management. When he has gathered the last crop, the woad will continue growing. It will not rise to leaves fit for the common service during the winter, but yet what grow at that season will not be altogether useless. The field will afford a very rich, wholesome, and nourishing food for sheep, and their biting, far from doing any harm, will prepare it for shooting stronger the next spring. After that it is to be managed exactly as the first year; and the first crops will be as good but not the following. The owner will see toward autumn, the necessity of renewing his plants, and he is to do it in this manner. When the last summer's gathering is over, he is to plow up the ground immediately for receiving fresh seed: but in this he is to observe a particular caution; for he is to leave a part of the old roots: they being to afford the seed for the succeeding crops. The rest of the old roots are to be harrowed up and thrown away, and these being left, and having the full advantage of the new plowed ground, will thrive at a surprising rate; and yield the next year such a quantity of seed, that an acre will sometimes yield fifty quarters.

This will appear the more strange when the reader recollects that each pod has in it only one seed; but the number of pods upon a plant is in a manner incredible. When the same piece of ground is to be in woad for a considerable time, this is the method of managing it: but we advise the farmer rather to observe the caution first given, and not keep any piece more than two years in this crop. In that time, if the land were ever so rank, it will bring it down to be fit for corn, and if continued longer will impoverish it too much. There is no land that can stand the exhausting of so large a growth cut so often, except it be refreshed by the horsehoeing husbandry. In this method the intervals, while they are plowed up for receiving the roots from the rows, enjoy in other respects a kind of fallow, and after two years the new crop may be sowed in the center of each interval, and the places that first held the rows will thus become intervals in their turn.

If this should not prove sufficient to keep the ground in heart, some dung may be used; plowing it in the intervals. It must be old mellow dung. By this practice the land may be kept in sufficient heart for any thing. There is no crop whatsoever that



may not be supported thus, ever so long upon the same piece of land, breaking the intervals often and well, burying mellow dung in them at times, and finally changing, at proper periods, the places of the crops, making that the middle of the interval at one time, which was the place of the rows at another.

## C H A P. XLVI.

*Of weld, or dyer's weed, and its difference from woad.*

**B**EFORE we enter upon an account of this plant, which may well enough be called a weed, as it grows wild by way sides, as well as in fields where it is cultivated, it will be necessary to observe one natural and frequent mistake that is made about it, as it is an error that may be very prejudicial: this is, the confounding it with woad. Its name weld sounding like woad, has led some into this, and its use in dying seems to have confirmed them: but notwithstanding this resemblance in name and use, the plants are altogether different, and the culture that belongs to one does not suit the other.

What is the more dangerous in this respect is, that those who have written to inform the husbandman, have too often fallen into the error. Mr. Houghton, whose collections on husbandry and trade are much esteemed, confounds the two as if they were one plant, and orders for woad what those from whom he learnt meant of weld, and what must ruin the husbandman who should depend upon it. This is to be found in his 381st number of the second volume, where his account and the directions following it, do not belong to either woad or weld, but are made up partly of what belongs to one, and partly of what belongs to the other.

This shews the necessity of those descriptions we have prefixed to each of these heads, of the plant itself: they may have appeared at first sight to some superfluous, and to others too particular, but here is a proof that they are in neither fault; that nothing can be more wanted than proper accounts of the plants themselves, before we enter upon their culture; and that these cannot possibly be too punctual or exact. Where such a person as Mr. Houghton should mistake, how is the common husbandman to suppose he shall escape; especially when he is desirous of improving his ground by some new product. There is no other way but by a perfect knowledge of the plant itself. He who had seen weld and woad treated of as distinct articles, and had read an exact description of each, could never suppose them both to be one and the same plant, or mistake one for the other; for scarce any two herbs are more different. It is in this, as in all other respects with relation to husbandry, in order



to practise it successfully, the person must understand it thoroughly. This is what we have attempted to inculcate throughout our whole work, labouring to make the most ordinary reader know the grounds and reasons of every thing he is to practise; and in every article begin at the foundation.

C H A P. XLVII,

*What weld or dyers weed is,*

**T**HOUGH the two names may perplex the unexperienced reader, none who has once seen woad and weld, can ever in his own mind confound the plants. Woad is a large plant with broad leaves, covering a great deal of ground: weld is an upright, slender, and tall plant, spreading at the utmost over but a very few inches. It grows wild on the banks of ditches, all over England. Culture makes no alteration in it, so that he who knows it wild, cannot miss it in the field. It is very upright, and scarce at all branched. The root is white and fibrous, the leaves that rise from it are long and very narrow. They lie spread in a circle upon the ground, covering a spot as big as a saucer: they are smooth, glossy, and of a pale but fresh green.

The stalk rises in the midst, and has a great number of leaves, like those of the root, but smaller. From the middle upwards it is covered with flowers: these are very small and yellow, and they often stand in a kind of spike of near two feet long: after them come the seeds, which are very small, and are contained in open seed vessels, a vast number in each. Each flower stands in a small green cup, formed of a single leaf, divided into four slender-pointed parts, two of which gape open more than the others. The flower is composed of three little yellow leaves, placed one uppermost and two sideways. The upper one is lightly divided into six parts; the two side ones are each divided into three parts in the same manner. Sometimes there are beside these three, two other smaller leaves in the flower: these are undivided, and stand at the bottom, but many flowers are without them. The upper leaf is rounded at the bottom, and has there a little receptacle for a small drop of honey juice; this receptacle is flattish, and stands erect just under the leaf. Within this flower are a multitude of fine small threads, each having a little upright button on its top. In the centre of these stands the rudiment of the fruit, or seed-vessel; this is rounded, and has three points rising from it of the length of the filaments. These receive the dust from the buttons at the tops of those filaments, and convey it down from their tops to the embryo seeds in the rudiment. When the filaments and leaves of the flower



are fallen off, this rudiment remains in the cup and grows larger, it becomes at last ridged and rising; the three points remain upon it, and it is open just at their origin. The seeds are numerous and very small. When nearly examined, they are found to be of a kidney shape, and they grow to the insides of the ridges of the vessel.

This is the structure of the flower and fruit of this plant, it was known to the antients by the name of Luteola, and in some places we call it Woad, which comes nearer the name of woad than the other. It ought to be called dyers weed, for the sake of distinction. The antients called it luteola, which signifies the yellow plant, either from its yellow aspect when in flower, or else for its use in dying yellow, with which they were acquainted, and to which purpose it is used at this time. In this it differs from woad, which does not afford a yellow but a blue colour. The husbandman can need no advice as to what kind he shall chuse, for there is but one that deserves his notice. We have a little sort of dyers weed wild in some parts of England, but it is a trifling plant, and not worth notice, the other is sufficiently distinguished from this by its bigness.

#### C H A P. XLVIII.

*Of the proper soils for dyers weed.*

**N**A T U R E points out the proper soil for this plant, and that is no small recommendation of it to the husbandman, for a very poor one will do. We see it wild, and its general situation is upon a ditch bank, or other dry and poor piece of ground; often upon a wall, and very frequently upon almost bare sand, or entire gravel. Nature by this points out a poor, barren, dry soil for it; and the farmer who has uses enough for his best land, will be very glad to know what to do with his worst. Weld will grow upon this with very little expence of dressing; and it is a commodity of certain sale to the dyers, and of no mean price. Let the husbandman who intends to raise weld, fix upon some poor, barren, sandy field; or let him chuse the driest piece of ground he has. Weld will grow upon the poorest ground, but it will thrive better, and grow larger upon such as is somewhat richer, provided it be of the right kind.

I have observed several pieces of ground to the south-west of London, where the soil consists only of sand, and a black mould; this is the best ground that can be pitched upon to yield dyers weed in large crops. It is a sort of land that requires a great deal of manure to make it yield well in the common way of husbandry, wherefore this would be a great improvement: such  
land



land will bear vast crops of this plant from year to year, without any expence of manure, and with very little culture. In many parts of Hertfordshire and Buckinghamshire, they have dry parching gravels, which yield little in the common way of sowing, and that at a very considerable expence: these would also bear dyers weed in great plenty.

These soils, all poor loams that are over sandy, and even the heath land that lies dry will bear it; and in many places estates may be made by the culture only of this trifling article. When the farmer has found a proper piece of land for it, he must examine whether there be a purchaser for the commodity near him. There are places where there wants the convenience of a ready and unexpensive sale. Under these considerations, few things can be more advantageous than the cultivating this plant, and nothing is more easy.

#### C H A P. XLIX.

##### *Of the sowing of dyers weed alone.*

**T**H E R E needs no particular preparation of the land for the reception of this seed, but there is none that requires more caution in the sowing. This may be done either alone or with some other crop: the first is preferable for very poor soils, and the latter for such as are somewhat better. When a poor piece of land is to be sown with dyers weed alone, nothing more is needful than plowing, and once harrowing. As to the time of sowing, the husbandman may take his choice of spring and autumn, but the autumn is preferable. The seed is extremely small, therefore a vast number goes to a little measure. This makes a little seed by measure suffice: but there is a great deal of difficulty in scattering so small and light a seed equally over the ground. Let the husbandman procure good seed in the quantity of a gallon to every acre. The farmers have a custom of mixing dust with the seed before sowing, to make it spread the more evenly, but this does not succeed. 'Tis scarce possible to sow so small a seed by hand alone, and the best crops shew how imperfectly this practice answers the purpose.

We have before us a letter from a very ingenious correspondent on this subject, which proposes a great improvement founded upon the principles of reason, and established by experience. We thank this gentleman in the name of the public, and wish for the sake of mankind, he would extend his observations to more subjects, and that others would follow the same useful steps.



## To the Authors of the Body of Husbandry.

GENTLEMEN,

“ Permit me to give you the most essential proof of my regard for  
 “ your undertaking, by contributing my mite toward the publick be-  
 “ nefit. What I have to relate to you regards a single article, and  
 “ one usually esteemed but inconsiderable; but it is one which I am  
 “ sufficiently certain might, with proper management, enrich many  
 “ a land-owner and farmer. The plant I mean is dyers weed: what  
 “ I have observed and practised concerning it as follows.

“ Observing that the poorest places abounded with this weed, I re-  
 “ solved to try a crop of it upon a piece of land I had, that scarce  
 “ yielded me any thing; and not having an opportunity of buying  
 “ the seed, I ordered a labourer to gather it from the banks,  
 “ and other waste places, when ripe. I am situated about eight  
 “ miles from the sea, in the county of Essex. I went with my la-  
 “ bourer to shew him the ripe plants, and see he made no mistakes;  
 “ and thus had an opportunity of observing the natural growth of this  
 “ plant in different places. I found this particular, that upon the  
 “ same soil, and under all the same accidents, the plants were larger  
 “ and finer between me and the sea, for two or three miles, than they  
 “ were on the other side.

“ You will perhaps think it fancy, and imagine that the sea can  
 “ have no effect on the growth of a plant, at five or six miles distance;  
 “ but having studied botany in my younger time, to me there was  
 “ nothing wonderful in this; though I soon determined to make the  
 “ discovery useful. There are on the side of my estate (for the little  
 “ land I cultivate is my own) that is next the sea, several sorts of tre-  
 “ foil that are not found on the other side, though the soil be the  
 “ same; and I have observed that several wild herbs, which will not  
 “ grow within the reach of absolute salt water, yet either grow in no  
 “ other places than such as are four, five, or six miles distant from the  
 “ sea; or no where so thrivingly.

“ From these observations, made at a time when I little thought  
 “ they would be useful, it appeared no wonder to me that dyers weed  
 “ should thrive better within this remote influence of the sea, than  
 “ elsewhere; though it grows naturally in all parts of the kingdom.  
 “ Upon this observation, and the practice of our farmers, of mixing  
 “ dry road dirt among the seeds of dyers weed, to make it spread  
 “ more equally in sowing, I founded the following practice, which  
 “ answered my expectations, and which is the occasion of this letter.

“ Having got together a good quantity of seed, I spread it on the  
 “ floor of a garret to air, and in the mean while ordered my bad  
 “ piece of land to be twice plowed and harrowed very even. It is  
 “ one of those brown dusty soils that we see on the heaths of Suffex.

“ Having measured out five gallons of seed, for my piece is near  
 “ five acres, and this is the common allowance; I ordered some fine  
 “ small red sand that lies upon our coast, to be brought in wet from  
 “ the sea, being pared away just when the tide was run off. I spread  
 “ this



“ this to dry a little in the same garret, and when it would just break  
 “ I measured two bushels and a half of it to my five gallons of seed ;  
 “ I saw these well mixed with a small wooden scoop, and then ordered  
 “ them to be sown. This was the second week in August. The seed  
 “ came up very regularly and strong, the lower leaves stood the  
 “ winter, and in spring the stalks shot up : I had my dyers weed ripe  
 “ three weeks before my neighbours ; and by the concurrent testimony  
 “ of all who understood it, I had twice as much as ever was raised  
 “ upon an equal piece of ground, in the memory of man.

“ This great advantage I attribute to several causes, all owing to  
 “ the mixture of the sand with the seed : but having related to you  
 “ the fact, which is the useful part, I shall be short upon the rest.  
 “ My piece of ground was a barren earth, therefore the addition of  
 “ the sea sand enriched it ; for though but small in quantity, the  
 “ spreading it even was a great advantage.

“ In the next place the soil was rendered somewhat lighter and  
 “ warmer than before, both which qualities fitted it the better for this  
 “ plant.

“ Thirdly, the seed was by this means very evenly distributed over  
 “ the ground, for by sowing it by hand in a careful manner, when  
 “ fresh mixed ; and before the sand was thoroughly dry, the seeds  
 “ stuck to one or other of the grains of sand, and the weight of the  
 “ one carried the other along with it ; whereas in the common way  
 “ of mixing the seed of this plant with dry dust, the dust goes one  
 “ way and the seed another ; and though the dust be very evenly  
 “ sprinkled, the seed is not.

“ Lastly, the great assistance of all I attribute to the salt hanging  
 “ about the sea sand. I doubt not but you very well know how rich  
 “ an improvement sea sand is to land, and how vastly preferable to  
 “ that of pit or rivers : in this case every thing concurs to make it  
 “ take the fullest effect. The improvement it makes in the soil is  
 “ what exactly suits it to the crop ; the richness it gives is conveyed  
 “ directly to the plant in its first shoot, the sand being sown with it :  
 “ and finally here is the advantage of that little saltiness, which so well  
 “ agrees with this particular plant, conveyed to land which lies too  
 “ remote for the influence of the sea.

“ Whatever you determine concerning my reasonings, the facts are  
 “ certain, and they are sufficient. I hope to see the improvement  
 “ communicated to the world by your means, and practised where-  
 “ ever there is a fit land for this growth, and sea sand within a pro-  
 “ per distance.

“ I wish your endeavours the success they deserve, and am with  
 “ respect,

Your humble servant,

CHRISTOPHER HAWKINS.

We can add nothing to this account of the best method that  
 ever was invented for sowing of dyers weed alone, but shall pro-  
 ceed to the way of sowing it with another crop.

C H A P.



## C H A P. L.

*Of sowing dyers weed with another crop.*

**A**S the second year is the time at which dyers weed comes to perfection, it may very well be sown with another crop. The small advance it makes under the shade of that more speedy growth, during its continuance on the ground, will be sufficient to give it strength in the root for the ensuing year. Some trouble and some charge are saved by this; therefore many will chuse it. There are only two crops proper, these are barley and oats: the seed is to be mixed in the proportion of a gallon to an acre, with the seed corn of either kind; and together with that it is to be rolled into the ground. It will shoot up soon after the corn, and will continue alive among it, though with a weak aspect.

As it only sends up the leaves from the root, and they lie naturally spread upon the ground, and will bear trampling, it will get no harm from the necessary treading down in the harvest, nor from the instruments. As the roots of the stubble decay, and there is no other growth to exhaust the nourishment from the ground, having air and food, it will strengthen itself and acquire a look of vigour. In this condition it will stand thro' the winter, and then shoot up in spring; and presently come to a fine and rich growth. The difficulty is to scatter the seed equally over the field. This is not done by mixing it ever so evenly among the seed grain, because the weight of the grain throws that forward, according to the direction of the hand, but this light seed does not keep it company. I should be for using the ingenious method of our correspondent, only mixing the sand in about half the proportion which he allows for the sowing with it alone. This will have the same effect of spreading it equally; and, far from injuring, will be an advantage to the corn. This is the best method of sowing dyers weed with another crop, but the other is preferable.

## C H A P. LI.

*Of the management of a crop of dyers weed in growing.*

**L**ESS trouble is required for this than most crops, but of the little that is needful nothing should be omitted. When the leaves are of some bigness, and spread with strength, hoers are to be sent into the ground: they are not only to cut up weeds but to thin the plants. In this caution is to be used: the shoots will be too thick in many places, but as this is an upright plant with few branches, it may stand much closer than others. About nine inches distance is sufficient for these plants,



plants, and if on any part they are thinner by the irregular distribution of the seed, it will be proper to thin them in other parts, by pulling up instead of cutting away the plants, and transplanting as many of them as are wanted to these.

The field is thus to remain during winter: in spring the owner should go over it, and if it be a poor soil he will probably find little or no occasion for more trouble. But if a rich one, weeds will be grown up in it, and in this case it must be hoed again. This is done at a small charge, and is very well worth while, it perfectly provides for the crop. After this the dyers weed is to be left to itself till the time of gathering. The strength it has got at the root in the autumn, and during the spring, will be shewn in the shoot at this time; and no weeds will be able to live near it.

## C H A P. LII.

*Of the gathering of dyers weed.*

**T**HIS is one of those crops that is to be gathered by pulling. This is to be done in the same manner as the pulling of flax, but with more care on account of the seed. The seed vessels are naturally open, so that the seed is easily scattered and lost: the more as it is so extremely small. This the owner is to guard against as much as possible, because of its price; the seed in this crop being no little addition to its value. Though very small it is produced in a prodigious quantity; every stalk being half way down covered with seed vessels, and these quite full of seed, and its price, one year with another, being ten or twelve shillings a bushel.

For the saving of this not only a great deal of care is to be taken in the pulling up the plant, but the proper time must be watched strictly. This also is necessary on account of the herb itself, and its use to the dyer. There is a degree of ripeness at which it is suited to his purpose; before that period it is unripe, and immediately after it changes greatly for the worse. This period of ripeness of the stalk is exactly that of the seed. When the stalk is ripe for the dyer the seed has its full growth: it requires only to harden a little, and this may as well be done out of the ground as in. The owner is to watch the colour and aspect of the stalk, and of the spike of flowers. The stalk is at first of a faint green, but when it ripens it grows yellowish; this is the first signal of its growing ready for pulling. Let the farmer examine the long spikes of flowers and seeds. The whole field generally ripens regularly, so that judging by two or three there will be no great danger of error. If there be many flowers on the spike downwards, and the seed vessels



at the lower part be green and soft, 'tis not yet ready; but by degrees these seed vessels toward the bottom of the spike grow hard, and there are only a few flowers on the top of the plant: then the season of gathering approaches. If there have been wet, new flowers continue shooting after the vessels harden, but these are not to be regarded. When the weather is fair this condition of the whole plant comes on very regularly and favourably; and the farmer cannot fail of knowing it exactly.

When the crop is ripe the pullers must be sent into the field, with orders to get it all up with expedition. They are to draw it up as upright and with as little shaking as possible; and then keeping it still upright they must tie it into small bundles, and set them up to dry. When this herb is dry it is fit for sale, but the seed is of no use to the dyer, nor would at all add to the value in his eye. Therefore the farmer is to take care to get it out for his own supply, and for market. When the handfuls have stood to dry in the sun, he is to have them housed; and after a little time he is to see if the seed be all hardened. When it is he must throw the bundles on a floor and thrash them lightly, to separate the seed. A very little violence answers this purpose. Shaking alone would very nearly do it. When the seed is out it is to be left on the floor three or four days to harden, that it may not be in danger of damage by keeping; and then is to be swept up and cleaned. The herb is to be sold to the dyers; and it is ready for them as soon as thrashed. The seed is to be sold, reserving a sufficient quantity for the succeeding crop, and this is to be sown as soon as it is thoroughly dried. Two good plowings and one harrowing will prepare the same ground for it again; and thus two or three crops may very well be raised without much expence. After this it is better to change the crop than manure the ground, for dyers weed is one of those plants that do not thrive with dung.

### C H A P. LIII.

#### *Of coleseed.*

**T**HIS is a produce confined to a few parts of the kingdom, but that might very well be carried to others. The plant is less known than any other among those cultivated for use. To ask what herb it is that yields this seed, would puzzle many beside the farmer. Even its name is not commonly known. Coleseed is the name of the seed only, it is also called rape seed, but this does not lead to the matter; cole is not the name of any plant, and rape signifies turnip. We shall explain this, and before we enter upon the culture shew the farmer what the herb properly is.

Coleseed



Coleseed is very well known in Lincolnshire, and some other counties; and rape oil is as well known, which is made from it. The seed is known at the shops, and the plant by the farmers who raise it: but nothing more. In some places the seed is sown among the other kinds of what are called young salletting; but in this case, the first leaves are eaten, and no more is seen of it.

While this ignorance remains about the form of a very useful plant, it is common wild on our ditch banks, and there needs nothing more than to shew its seed to the Lincolnshire farmer, for him to say that is it. These are the inaccuracies and errors which retard the progress of improvements in husbandry. The articles are themselves unknown. The price of coleseed is very considerable, reckoning the quantity an acre yields; and if the farmer will be at the trouble of drawing the oil, the method is very easy, and his profit will be vastly greater. Nor are these all the advantages he receives from the growth of this plant: it will grow on soils which will not yield any thing else to advantage.

#### CHAP. LIV.

##### *Of the coleseed plant.*

**T**HÈRE are three plants, each containing several species, and distinguished by different names, but very nearly agreeing in their flowers, seed vessels, and other general circumstances; these are, 1. The cabbage. 2. The turnip; and 3. The navew. The confusion that has been made among these, has been one occasion of the uncertainty about the coleseed plant. The root of the turnip, and the stalk of the cabbage, are what principally distinguish them; as to the navew it differs very little from the turnip, and that principally in the smallness of the root. The flowers of all these are alike, and the seeds resemble one another, and they will all yield rape oil; but there is one kind that affords it in greater quantity than the others: this is the wild navew, called *Napus Sylvestris* by authors, and this is the proper coleseed plant.

Authors figure a wild navew, and this is what we have on the banks of ditches. We have observed that the navew differs little from the turnip, except in the shape and bigness of the root; and this plant, which otherwise much resembles the turnip kind, has a long, but very small root. We generally receive the seed from Holland or Flanders, and I have observed that the seed from different places is not all of the same kind. I have seen a field of the yellow turnip raised from coleseed, brought from Flanders; and another of a particular plant of the cabbage



bage kind, from seed from Holland. These were equally called coleseed, and they answered the purpose; the seeds were smaller in the first, and dusky in the latter, than those of the wild navew or right coleseed plant, but they each yielded a good quantity of oil.

Any of these kinds therefore will answer, but as the wild navew yields much the finer seed, and much the larger quantity of it, and is also richest in oil; 'tis best to cultivate that only. The proper coleseed plant, or wild navew, is four foot high. The root is long, slender, and white, 'tis of a sweet taste like a turnip, but with somewhat more warmth. The lower leaves are long, large, deeply divided at the edges, and of a dusky green. One stalk usually rises in the midst of these: this is round, smooth, of a pale green, and divided into many branches. The leaves stand one by one, not in pairs, they are smaller and narrower than those from the root, and are of a paler colour. The flowers grow at the tops of all the branches, they are small, of a bright yellow, and perfectly resemble those of the turnip: after these come pods, which contain the seed. This resembles turnip seed, but it is larger and smoother.

This is the wild navew of our fields and on banks. When it is cultivated for coleseed it grows somewhat taller and more branched; the flowers of the coleseed plant, when nicely examined, are thus formed. They stand in a cup composed of four little oval pointed green leaves, and this does not remain after the flower is faded, as in the dyers weed, but perishes and falls off with it. The flower is composed of four plain narrow yellow leaves, placed crosswise. They are of the same length with the leaves of the cup. In the center rise six filaments, four of these are considerably longer than the other two: they have small pointed buttons growing on them. In the midst of these rises a small upright rudiment of the seed vessel; this has a kind of button at its top, in which there are small openings for receiving the fine dust out of the heads of the filaments. When the leaves and cup of the flower are fallen, this part enlarges, and at length becomes a seed vessel of a longish shape, divided in the inside by a membrane, which shews itself beyond its extremity, and containing several large, round, bright seeds. The seeds of the natural wild plant may be gathered and sown; but those from such as has been cultivated raise the stoutest plants, these therefore the farmer is to chuse, according to the following marks.



## CHAP. LV.

*Of the choice of the seed.*

**T**HE seed of the navew is this right and proper coleseed ; it is very large, smooth, and of a fine bright colour. All the seeds sold under the name of coleseed resemble one another, but the worser kinds are either smaller or of a duskyer colour, and less smooth surface. 'Tis easy to be deceived, till they have been seen together : but after this the right kind will always be known by sight, and the careful husbandman will be in no danger of mistaking. Coleseed is easier damaged than corn. It consists of a great deal of soft pulpy matter, under a thin shell or crust, therefore it is naturally moist. If it be not carefully kept it will grow damp, and this is a certain destruction to it. Let the husbandman take care that he buys dry seed, and such as has been always kept dry ; not what has been damp and dried again. He will know this by the colour and the smell. No seed is so apt to damage by moisture, and in this case it gets a raw musty smell, which never goes off entirely, though it be ever so well dried afterwards. Also as soon as it becomes damp enough to be damaged, it loses the fine bright colour on the outside, and this it never recovers. The sweetness and brightness of the seed are the great marks of its being in good order. As soon as the seed is bought, if the ground be not entirely ready for it, spread it on the floor of a dry airy garret.

Although the plant is equally a native of England and Flanders, it thrives more in the latter place, and ripens its seeds better ; so that they are more perfect, and are fit for the production of the strongest and largest plants. Flemish seed is always to be had ; and it will be to the farmer's advantage to get it. The people in Lincolnshire and Northamptonshire sow the produce of their own crop, but this from time to time dwindles ; and there is no comparison between a field of coleseed raised from such seed, and one from Flemish, other circumstances being equal. All seeds shoot the quicker and the stronger for being new ; and none shews the difference more than coleseed. I have seen the experiment tried by Mr. Grestone, who for curiosity sowed the seeds of several of his own successive crops, and tried them in a piece of garden ground near one another. The last years seed was up five days before some of the old, and above a week before others ; and the number of plants from the same quantity was also greater. The newness of the seed may be known by the clearness of the colour. Let the husbandman get a quantity of this good seed  
from



from abroad for his first attempt, and he may if he pleases sow the produce of that for two years more upon his land; but at the end of that time, it will be necessary to have recourse to the same foreign seed, to keep up the credit of his crops; and if he will be at the additional expence of foreign seed every year, he will be repaid with great interest.

## C H A P. LVI.

*Of the proper soil for coleseed.*

**W**HEN the farmer has procured good seed; let him pick out the most proper piece of his ground for the crop.

This will depend on the two articles, soil and situation; the richer the land the better; and it should lie tolerably dry. There is no part of England where so much coleseed is raised as in the fens, but the lands are first drained that are intended for this purpose: they cultivate it also in Flanders and Holland on grounds originally marshy; but they are at all the necessary pains and expence of making them properly dry first.

No lands are more fit for coleseed than such as have been subject to overflowings, but they must be secure from that accident while the crop is upon them: and must be properly dry, to receive it. Whether this overflowing have been from land floods, great rivers, or the sea itself, it prepares them equally for the crop. Those where salt water has come, are properer than any others; but they require somewhat more preparation. There are parts of Essex where the husbandmen might raise coleseed to great advantage: and in many places where grounds have been newly recovered from the sea by banking, coleseed is an excellent crop. Every piece of fat rich land is proper for it; and it will yield to his full content. If he has a piece of ground too rank for wheat, let him sow it with coleseed: this will yield an extreamly rich encrease, and the land that would not before have done for corn, will be perfectly well prepared for it by this means. The right soil for coleseed is mellow earth. The plants never grow so robust, nor the seed is not formed in such plenty, or ripened in such perfection on any other. This is the reason that marshy and fenny lands, when properly fitted for the purpose, answer so well.

## C H A P. LVII.

*Of preparing the ground.*

**T**HE soil we have recommended does not require great labour in tilling; nor does the coleseed demand any particularly to its own management. This black mellow earth cuts easily, and turns freely under the plow; and when it is in a proper



proper degree of dryness, breaks finely in the working. All that is necessary to fit it for coleseed, is to make it very fine; and this is a condition whereinto it is brought easily.

In May the land intended for coleseed is commonly fallowed: in June it is twy-fallowed; and in the latter end of that month, or the first week in July, the coleseed is sown. After the last plowing, a fine toothed harrow should be drawn over: after this, if the weather be dry, let there be a light roller carried over it: then let it be very gently and tenderly harrowed again. This last harrowing makes it as even as the flower border in a garden, and this is the proper condition wherein it is to receive the seed. If the weather prove too wet, let the rolling be deferred; and afterwards performed with great caution: for tho' the roller may do great good in this case, it may also do much harm. In some lands the soil is naturally so loose, but once harrowing divides it sufficiently.

# C H A P. LVIII.

## *Of sowing the seed.*

**T**H E farmer is to make his choice which method he will follow, that of the old, or that of the new husbandry. If he chuse the old, his neighbours soon will shew him that it is easy to reap a large advantage from this growth; and it will be the greater to him as he the more strictly follows the cautions we have before given, relating to the choice of seed, and other articles. If he will use the horsehoeing husbandry, he will reap a greater advantage. This method is so new, that we have not in all cases an opportunity of recommending it upon experience; but in many wherein we have not had the advantage of a trial, we may safely propose it from reason. The value of this crop, is the quantity of seed. This will be the more as the plants are stronger; and there is no doubt but they will be much stronger when they are raised by the horsehoeing method.

There are other advantages of this growth; but this of the seed is the principal, and deserves the greatest notice. The husbandman may have either a great many plants growing irregularly on his field; or a smaller number disposed regularly: he is to consider which of these will yield him the greatest quantity of seed, and he may be certain this will be from the larger plants. In irregular growing they starve one another; and the earth between them cannot be stirred to any depth for nourishment: therefore they will be small, and will shoot up in height like herbs raised under shade; and will have few branches. In the other method they will be robust, and will spread every



way in branches, and all these branches will be full of seed vessels. The number will be greater, and the seeds will ripen to more perfection; because the plants stand at a distance; and the earth can be turned up by the horsehoe between them. In the common way, five pounds of the seed is allowed to an acre. In the drill method two pound and a half will be full enough: and two rows may very well be drilled at ten inches distance, with a five foot interval between them.

## C H A P. LIX.

*Of sowing coleseed in the drill way.*

**I**N the common way, coleseed is to be ordered in the same manner as turnips. When it is got to some small height, hoers are to be sent into the ground, to cut down the weeds, and thin the plants. To thrive well in this way, they should be suffered to stand at about ten inches distance.

When the husbandman shall raise this crop by the drill and horsehoeing method; they must be hoed when they have got a little strength. We need not repeat the particulars, the same management should be observed as in hoeing of turnips, raised by this husbandry. The weeds in the partitions are to be cut up with a broad hand hoe; and the plants should be at the same time thinned till they stand but one every foot and half, and these not opposite in the two series, but one in each row opposite to the middle of the space between two in the other. When the plants are cleared out and thinned, let the horsehoe be sent in as soon as any weeds appear in the intervals. This is to be repeated as often as the weeds rise, observing, that at first the plow is to tear up only the middle of each interval; and afterwards that it come nearer the edges.

The farmer need not be uneasy at the distance of his plants, or at the space of ground that is left vacant between every pair of rows. They will yield the more. They will grow robust, and as it is their nature to send out on every side a great many branches: from these there will shoot others; and they will all be loaded with seed vessels, so that moderately speaking, and judging from what is seen in the course of this method of husbandry in other kinds, one plant may be expected to produce as much seed as six in the common way.

## C H A P. LX.

*Of managing the crop.*

**W**HICH ever method of raising the crop be used, the owner is to consider, that it has more uses than one. Though the seed be the principal consideration, it is not the only



only one ; and the more regard is to be shewn to another, because it comes in order of time before it. This plant is of the eatable kind : as it does not grow so much into root as the turnip, its leaves are more delicate. Sheep are very fond of them, and they afford a rich and wholesome nourishment. This is a great article. The sheep are supplied at a time when they extremely want nourishment, and the crop is improved by it.

Coleseed having been sown in the beginning of July, shoots with some strength ; keeps itself up during the droughts of autumn, and getting new strength and size in the leaves from the rains, which introduce the winter, becomes in a condition to resist the strongest frosts. It stands well, and on every open day or two, grows during the depth of winter ; so that in January, February, and March, the ground will be well covered. The leaves which now rise, are of no real use to the plant in perfecting its seed : that is to be done the succeeding summer. If they grow very rank they rather are injurious, swallowing up too much of the nourishment which should go to the forming of the young stalk : therefore they may be spared without injury. Here is a great supply of food for sheep, at a season when grass is low, and the sheep may be turned in without any damage to the succeeding crop.

Some sow coleseed for this use alone ; and it answers the intent very well. They use the poorest land for this purpose, and although the plant would never grow vigorous and strong so as to yield any profitable quantity of seed, it shoots up very well in leaves. In proper lands, the leaves at this season are much finer and stronger. There are those who prefer the cole plant on these poor lands for food for sheep, to the young growth on such as is richer, and they say it is more wholesome ; they are not without reason, but their experience on this head should not have led them to discard the use of coleseed for feeding on rich ground, but to use it with discretion. The disadvantage that attends the feeding of sheep on the rank growth of coleseed in rich ground is, that it makes them swell. This is the same consequence that is taken notice of in the feeding them on clover : but it is easily remedied. 'Tis only at first that this rich food takes so ill an effect, and it may be prevented by proper regulations. When the sheep are first turned in, let it be toward the middle of the day ; and an hour before sun-set let them be driven out again into a common pasture. The next day let them be turned in earlier, and driven out later ; and so the third, fourth, and fifth. After this let them be just driven out at night for two or three days more, and let in again in the morning. This will prevent the effect of the coleseed at first,



and being now used to it, they may be left in the fields altogether. The first shoots of coleseed are not all that serve this purpose. There is another growth of them less rank, and the sheep love it better.

We shall in the next chapter treat of the gathering of coleseed, and should after that name the shoots which rise from the stumps: but these being a food for sheep, we shall trespass upon regularity, to avoid dividing this article of their feeding. The shoots of the coleseed after gathering the stalks for seed, are the mild, sweet, and wholesome food we have been naming. These grow very strong when there has been rain, but they are never rank. Every one knows the difference there is between the cabbage and coleworts; full grown leaves first cut for the pot, and the sprouts that grow on the stumps and stalks after cutting; the difference is the same between the first growth of large leaves from the coleseed plant, and the shoots that rise after the cutting down the full grown stalks for seed,

The root of the cole plant is very strong, it does not decay when the seed ripens, but the crop being cut for that purpose, the strength below soon shews itself: a great number of shoots rise from the part of the stalk where it was cut off, and from the joints between that and the root; and some from the top of the root, surrounding the stalk. If the coleseed plants have been cut up for seed in the end of June, these shoots appear about the second week in July. They make but a slow progress while the weather is dry and sultry; but when some rains come, they rise apace. These all tend to stalks, and would form so many new plants for seed, but that would not ripen well, nor would come in any quantity; therefore it is not the farmer's interest to encourage it, and the beginning of the shoot is at a season when the weather seldom favours its rising to any height.

Before these young shoots get strength for rising to stalks, the cold mornings come in, and stop them, so that they continue small and low; but they grow bushy from the nourishment they receive from rains. This is just what the farmer desires, and they grow more and more fit for the sheep, and are in excellent condition at the time when they are most wanted.

The farmer must consider the condition of his stock, and the value of the land on which this crop is to grow: he will thus be led to know how far it is proper to encourage, or suffer the standing of it after the gathering for seed. If he find it advisable to continue the growth, he may vastly increase it by a proper management. If it be sown at random, it must be handled just as the shoots appear. Nature may be left to herself  
for



for a little time, after the stalks are cut down, and will give strength enough to the roots to make the shoot; but if a dry season follow, these young shoots will turn yellow.

In this case it will be proper to clear the ground between the stumps, and the deeper the hoers cut the better. The weeds are few and small that can stand upon a coleseed ground, so that the destroying these is but a slight part of the design in hoeing: its great advantage lies in breaking the ground, and making it better receive and detain the dews.

This hoeing has another use, which is the cutting afunder some of those fibrous roots that spread from the bottom of the stalk, under the surface. Each broken root will send out many new ones, and these will have a fresh earth wherein to spread. From this, which is the method in the common way of husbandry, we shall proceed to that more beneficial way of doing it by the horsehoe, when the plants have been sown by the drill. Nothing is of so great service as breaking the ground well while the plants are growing upon it. If he resolve to continue the crop, it is to be effected in the common method, by promoting the young shoots, but this is only for a time: on the contrary, in the horsehoeing method, the same piece of land, if the farmer think convenient, may bear coleseed for ever, and that in a beneficial method: not only for the crop, but the feeding.

We suppose the coleseed raised in double rows, with proper intervals between pair and pair. In June the plants are vigorous, and they will soon be ready for cutting. The intervals afford space for the management of the plants; and as soon as they are cleared off, and the seed thrashed out, these are to be plowed up with the horsehoe. This furnishes the roots of the old plants with abundant nourishment, so that they shoot up the sprouts with strength; and at the same time double rows of fresh seed may be sown in the middle of each interval for a succeeding crop. Both will flourish greatly: the leaves from the roots of the new sown plants, and the sprouts from the stumps of the old ones: these last will grow with a particular freshness and vigour, because all the working of the intermediate earth for the sowing of the new crop, will be so many additions of tillage upon tillage for them; and the roots of the seedlings will not spread so far at first as to interfere. Thus they will flourish together during the remainder of the summer, the autumn, and the winter; and in early spring, there will be a double supply of food for the sheep.

In the end of March when the sprouts are eaten down, for the sheep having their choice of both, will be fondest of them,



they are to be plowed up by the hoe plow ; and the places where they stood are to be made the intervals for the new crop. This new succession will by the time just mentioned, have spread out their roots in abundance toward the places where the old crop grew : the plowing up of the roots of that crop, will break and cut off those of the young plants ; and this earth being thoroughly broken, will be full of nourishment, and ready to receive them. Thus the ground will be by the same operation cleared and tilled. The plants will be vigorous, and full of seed ; and the crop will be ripe and ready for cutting, a fortnight sooner than in the common way. In this manner, only repeating the same management on every new occasion, the same piece of land may be made to yield a continual succession of coleseed crops, without fallowing ; and, if it be tolerably good earth, without manure.

One thing we must caution the farmer who shall have the sense and spirit to raise coleseed this way, which is guarding against the too great luxuriance of the sprouts. They advance slowly during the summer, in the common way, and it is to his advantage, for otherwise they would run up to stalk. If rains happen soon after cutting the old plants, this accident will happen in the common way, because more nourishment is supplied than is wanted in the leaves ; and the same thing happens much more certainly from the deep plowing the intervals, when raised by the drill and horsehoeing method : therefore if rain falls soon after, or if the shoots are over rank without, let him go round the field, and with his thumb and finger knip off the top of every shoot that is running up to stalk. By this the advance upwards will be stopped, and the abundant nourishment will furnish new shoots upon the sides of the first. There will thus stand, as it were, a forest of green low bushes without one stalk rising toward flowering : for when such as were most forward are nipped this way, the cold weather coming on checks them, and all the nourishment they draw from that abundant resource of tillage, will go to enlarge the first leaves and to form others. A little observation of what passes in the common course of nature, will shew the farmer how essential it is to nip these rising stalks.

It is not a crop of seed he now wants, what he in this case desires to have is a supply of leaves, for the food of cattle ; and the merit of this crop is, that these leaves be numerous, fresh, and full of juice. Let him observe what happens to the leaves of other plants : when they have all the nourishment to themselves, they are numerous, fresh, and full of juice ; but when the stalk has got to any height, and the rudiments of flowers appear,



appear, the nourishment taken in by the root all goes there. The leaves become dry and yellow, the older fall off; no new ones grow in the place, and in fine all decay, and the stalk alone remains rising naked from the root. The use of the leaves which rise first from the root, is the same with that of the beautiful parts of the flower. Although these seem the perfection, and greatest beauty and excellence of the plant, they are intended only to shield and defend the little rudiment of the seed vessel, in their centre: in the same manner that fine spreading shew of leaves, which first rise from the root of a plant, are in reality of no other use than to secure and preserve the little rudiment of the stalk, which is hid in their centre. As soon as the dust from the little buttons in the flower has impregnated the rudiment of the fruit, the gaudy leaves decay and fall off, the nourishment being all conveyed to the useful part, the fruit or seed vessel; and in the same manner, as soon as these leaves have defended throughout the winter the young bud of a stalk, and that by the heat of the spring begins to rise in height, and shew its buds for flowering, all the nourishment is conveyed to it: the lower leaves have done their business, and they fade and perish.

The case is the same in the shoots from the old stumps of coleseed, as in the leaves from the root at the first sowing. The tufts of leaves that rise from the top, and from every joint of the old stump, have the rudiment of a stalk within them. This is the purpose of nature, but it is the farmer's business now to check it. When it rises the leaves fade, but so long as it is kept down, all the nourishment will be given to the leaves.

#### CHAP. LXI.

##### *Of the gathering of coleseed.*

**T**OWARD the end of June the coleseed plant will be fit to cut. The husbandman must keep his eye upon his field carefully toward that period. It is of the utmost importance to seize it when it comes. No day of the month, or other precise time, can be named, because the differences of soils and seasons promote and retard the ripening; and even the variety of management, or age of the plant, may make ten days or a fortnight difference in two fields of the same soil the same year. As the soil and method of culture may make a great alteration in the time of ripening, he must be upon the watch accordingly; expecting it earlier by a fortnight in rich soils and from the most careful conduct, than he need in poor land in the common way. The coleseed plant has small flowers on the tops of the stalks, which when the leaves fall off



are succeeded by pods. As the first flowers are followed by the seed vessels, others open upon the tops; which shoot up continually higher. When the plant begins to flower, nothing is seen but a little tuft of buds at the top of the stalk; but when it has been some time flowering, the branches having lengthened, from their beginning to flower, all that part which was the top, and where successively the former flowers appeared, is covered with seed vessels: thus each branch terminates in a spike of seed vessels a foot or more in length.

The quantity of seed is the value of the crop. It would appear at first sight, that the longer the plant stood, so long as it continued flowering, the more advantageous would be the growth; but there are limits to this encrease, beyond which all is waste. The course of nature is to ripen these seeds, and then shed them upon the ground for producing the plant again. When ripe the pods open of themselves, and the seeds are lost. This no art can prevent; and for that reason the time is to be watched when any of them begin to open, and that is the most exact period for gathering. When a new flower is formed, the rudiment of the pod from which the last fell, is but small; it continues to encrease before it begins to harden, or properly speaking to ripen, so that several successive young ones are left by the flowers before any one is ripe. This is the occasion of the length of the spike of pods, while all are yet entire. When they begin to open, let the husbandman be speedy in gathering, for he will deceive himself very much if he imagine it as well to let it alone awhile, supposing the new formed pods at the top will make amends for the old ones that are lost at the bottom: the lowest pods are the fairest always, and three of the young ones will not supply the place of one of them.

The farmer understands the period whereat his crop is to be gathered; and it will be easy for him to judge at sight when it is about to arrive at that condition. The length of the spikes is one obvious token; while they are short the crop cannot be fit to gather, because, while they are in that condition there are but few of them, and none are ripe. When the spikes have a considerable length, their colour is to be regarded. The pods while young are always green, as they grow toward ripeness they lose that colour; at first they become pale, then yellowish, and lastly brown.

The whole spike, while very young, is green. When some of the pods approach toward ripeness they change colour, and the greenness is only seen at top; when, upon a cursory view, there are some found to grow brownish at the bottom, and those the middle are yellowish or pale, those at the top only being green,



green, the time of gathering is at hand. It is the interest of the owner to let them stand so long as all are safe, but no longer. He is therefore now to look into the field once every day, in a more strict manner. He must examine the bottom pods of the ripest spikes; and as soon as some of them begin to open the time of gathering is come, for after this every hour's standing will be attended with loss.

The best method of cutting coleseed is with a strong sickle, as wheat is reaped: but this must be done carefully. There is no part of the farmer's occupation that requires more expert and honest labourers. The stalks are thick, and by that time the seed is ripened, they are grown hard. They are not easy to be cut, and yet that must be done evenly, and with little shaking. Care is to be taken, that the sickle goes easily thro' them, and when separated from the root they must be laid gently down in handfuls, that they may dry. One third part of the seed is ripe at the time when the lowest pods are ready to open: in the lying exposed to the heat of the sun, more than another third hardens, and becomes good; so that above two thirds of the whole quantity of pods yield good seed, and this is all that can be expected. If the farmer were to stay for the ripening of the other third, while growing, he would lose the seed from the lower pods, which is much more valuable.

In the common way of sowing, 'tis difficult to lay the handfuls well to dry from the reaping, and a great deal of the best seed is lost for want of this advantage; but in the way by drilling it is easy, for the intervals will serve excellently for spreading the plants. When the crop has been once laid on the ground it is not to be stirred till dry, for the seeds in the lower pods are so loose, that they will shake out with the least motion. What is required from this exposure is, to dry and harden them, and they will get this sufficiently by lying thin, without being moved. If the weather be hot the business is done the sooner, generally from ten days to a fortnight is sufficient. The proof that they are dried enough is, when the pods toward the upper part of the spikes open easily, and the seeds in them are hard.

#### C H A P. LXII.

*Of thrashing the plants, and the uses of the seed.*

**W**HEN the crop is in this condition, nothing is required but to get it to the barn, and thrash it. In Lincolnshire they save themselves a part of this trouble, by thrashing it in the field: they spread a large sheet upon a level part of the ground, and lay a quantity of the herb on it: a little thrashing serves



serves to dislodge the seeds, which are already loose. I have seen this practised without much loss, but it is an irregular and awkward method; it leaves the farmer's produce at the mercy of the winds, and cannot be performed so well as within doors. The method I would recommend, if the ground be near home, is this, let a parcel of large sheets be spread in the field, and the dried stalks carefully taken up in their bundles, and laid on them. Each sheet will hold a great deal this way; for though the parcels must be very gently moved to the sheet, they may be pressed hard, and handled roughly there; for what seeds fall out will be saved.

When the sheets have as much in them as they will hold, the edges and corners are to be gathered in and fastened, and the several parcels carried to the barn: there they are to be thrashed with a careful but light hand, that all the seed may be got out, and as little of it as possible bruised, for it is tender and easily hurt; especially when fresh. After it is separated from the refuse, it must be spread on a floor, and turned often till it is thoroughly hardened. The seed thus prepared for keeping is also in a better condition for use, than when too green: the farmer may sell it, or send it to the mill on his own account to be ground and pressed for rape oil; the sale of which is certain, and the price, considering the charge, tolerably high. If the seed be sold as soon as thrashed and dry, it brings from eighteen to two and twenty shillings a quarter, and the produce at an average in the common way of management, upon middling ground, may be reckoned at five quarters to an acre. Much more advantage may be made of it, if the farmer will have the oil drawn himself; and in the method we have proposed by the drill and horsehoeing husbandry, it will be easy for him at any time to double his profits: in many cases, taking all the necessary care, and making the most of his produce, he may make it treble.

In the new method the same piece of land may be made to bear coleseed ever so many years in succession. According to the vulgar practice the several kinds of corn may be sown after it. In Northamptonshire, where the land is rich, they find coleseed a good preparer of it for barley or wheat; in Lincolnshire, where it is not so good, they sow oats after it. The use of the coleseed is not over when the oil has been pressed from it. The cakes that remain are a large quantity, and as the fresh leaves feed sheep, these turn to a very good account for feeding of cows. In winter this is an excellent food: keeping them in heart and strength, at a time when grass is scarce.

Calves may also be fed with coleseed cakes, but that in a particular



ticular manner. After the oil is pressed out as clean as the common practice can obtain it, there still remains so much of it in the cakes, that when they are beat to powder, and mixed with hot water, they make it white and milky. This is the way of giving it to calves, and it proves a very rich, wholesome, and strengthening food. They may be fed with this from three days old, till they are fit to eat grass or hay.

In Flanders and Holland, where coleseed is raised, and its oil is pressed in great quantity, they make both these uses of the oil cakes: it is surprizing that in many parts of England, where they raise this crop, they know no other use of the cakes than as firing. In Lincolnshire they heat ovens with them, while they want winter provisions for their cows.

C H A P. LXIII.

*Of liquorice.*

**H**itherto we have treated of articles known to be raised by husbandmen, in different parts of the kingdom, and familiar by name among country people; here we mention one which, being less common in the profession, may make some of the common practisers of husbandry wonder at its being added to the list. They know liquorice by name, and they are sensible that it brings a large price at the druggists: much of it is imported from Germany, and other parts of Europe, but very considerable quantities are raised in some parts of England, and may be in many others. Great gains are to be made in husbandry by going out of the common road; and this is one of the instances.

The root of the liquorice plant is a yard long, and as thick as a man's thumb. It is soft but very tough, brown on the outside, and yellowish within: it is full of juice, and though not easily broken, may be beat out into a kind of thready substance: its taste is very sweet and pleasant, it spreads and increases greatly in the ground, and is less in danger of accidents than most other roots. The stalks are tall, firm, and tough; they are a yard or more in height, they have but few branches, they are of a brown colour, and are covered with a kind of clammy moisture. The leaves are like those of the tare, each composed of a great many smaller ones, placed on the two sides of a stalk, or a middle rib. The flowers are of the form of those of the tare, but small and inconsiderable; and they are succeeded by pods, which are short and flatted.

The flower of the liquorice stands in a small green cup, composed of a single leaf, hollow at the bottom, and toward the upper part is divided into two lips; the upper lip is again divided into three parts, two narrow and pointed at the sides, and the



the middle one broader and nicked in the middle : the under lip is undivided, and is narrow and pointed. The flower is composed of four leaves, in the manner of all the tare kind. In the body of it are ten filaments, one stands alone, and the other nine in a cluster ; at the tops of all these there are round buttons ; and in the midst rises a small lump, which is the rudiment of the pod ; this is buried in the cup, and sends out a long filament pierced at the top, to receive the dust from these buttons for impregnating the seeds.

When the flower has fallen off, this rudiment by degrees enlarges into a short, flat, and sharp pod, in which are a few kidney-shaped seeds. There are two kinds of liquorice beside the common, distinguished by having hairy, and the other prickly pods, but these are not worth the farmer's notice ; the smoothness of the pod distinguishes the right genuine liquorice used by the apothecaries, as does also the bigness, juicyness, and fine taste of the root ; the others have sweet roots, but they are harder and less pleasant.

The common liquorice is a native of Germany, France, Spain, and Italy ; we have it not wild in England, but being natural to climates so much resembling our own, it grows with us in perfection. It was well known to the antients, who called it *Adipfos*, because it conquers both hunger and thirst. Theophrastus mentions it under the name of the *Scythian root*, *Scythia* being the first country where it was known to be cultivated. It served those people by way of nourishment ; they would live a long time upon this root and mare's milk cheese, without seeking after any other food. With us it is raised in some parts of Yorkshire, Nottinghamshire, and Surry : and may be introduced in other places, to the great benefit of the industrious planter.

#### C H A P. LXIV.

##### *Of the proper soil for liquorice.*

**A**Lmost all plants thrive best in a rich soil ; but liquorice will not grow in any other. This soil must run deep. Its length of root, which is the great advantage, cannot be expected in any other. We expect to see the root a yard or more in length, and it must have free passage, otherwise it will not grow strait : this regularity of shape is not only a beauty, but a real advantage, for the crooked roots are never so tender or juicy as the others, nor do they so soon arrive at their due growth.

The proper ground for liquorice is that which has a deep coat of mellow earth ; a black mould that begins directly under the turf, and runs three spit deep, without any great mixture of other matter in the way. This is the best natural soil, but  
there



there are others which will answer. The next soil is a deep rich loam, that has not much of the clay in its composition, and has a good deal of fine garden mould among it. The third natural soil is the deep, warm, sandy kind, which is not barren, but with its lightness and warmth has some richness. In all these the depth ought to be at least a yard, before there is any hard bottom, and that must be examined; for if it prove a clay the liquorice will never thrive, because of the coldness and dampness that naturally attends such an under stratum, the wet lodging upon it.

The liquorice requires four articles in the soil: depth to penetrate, lightness that it may make its way easily, warmth to promote its growth, and richness to supply it nourishment. These advantages it enjoys in various degrees in the several natural soils we have named, for no one of them has them all in perfection; and therefore it may be possible by art to provide a mould for the growth of liquorice, which shall be better than any of these.

In the mellow earth there is depth, lightness, and richness to supply it nourishment; but this soil is apt to be cold: there wants therefore the fourth article warmth, to promote the speedy encrease of the root. In some of the loamy soils there is lightness, depth, and warmth, but there wants richness; and in the sandy there is depth, lightness, and warmth in the greatest degree, but there wants richness and nourishment. The effect of these advantages and disadvantages I have regarded in the observations I have made on the places where I have seen it grow. In Yorkshire, where the soil is a mellow rich earth, the liquorice is very large and juicy, but it grows slowly; in Nottinghamshire the soil is loamy, and the liquorice grows moderately, but is inferior to the Pomfret kind; and in Surry, where the soil is sandy, the root grows quick, but it is meagre, dry, and poor, it never has the fine juicy texture, or rich taste of the Yorkshire kind.

From these advantages and defects in the plantation of others, the judicious farmer will find the way to make the best profit of his own; by adding what is wanting in each, and avoiding what is amiss. In the preceding observations we speak of these several soils as left to nature, for when they are manured they are changed; and it is impossible to describe the soil of any place, as altered by the various means of culture.

To these several grounds, for the service of this article, we are to add the made soils about London, where there is a great deal of liquorice raised to a considerable profit. This is large and juicy, but it is not so good as the Yorkshire root, it is less tough, and is more subject to accidents, nor has it the fine  
yellow



yellow colour, or true rich taste. It will grow mouldy if laid up in damp sand, whereas the Yorkshire kind will keep perfectly well in that manner for a long time; and when beaten out for use the threads are more wet, and as it were rotten; they have not the stringy firmness of right liquorice: the plant is the same in all these conditions, 'tis the soil only that makes the difference. The liquorice of Surry is starved, that of Nottinghamshire is but half nourished; that raised in gardens about London is over supplied with nourishment, and that is of too rank and moist a kind: the same is the case with many other of the products of these common gardens, though less regarded.

We see by the several natural soils, and their effect, and by that of the made ground about London, that each of the others may be improved; consequently that a made soil may be better for liquorice than any of them, but we see at the same time, that the garden ground about London is not the right kind. What the careful husbandman is to learn therefore from these several observations is, that there is an easy way of mending any natural soil, for the production of liquorice; and that whatever his ground naturally be, he may convert it into a proper sort by additional mixtures. The defects and faults of those soils on which liquorice is propagated in different counties of England, are so opposite to one another, that it is easy to improve any one of them, by a mixture of the other; consequently, if the farmer have a soil of the nature of any one of these, he may improve it and encrease his annual produce greatly, by mixing with it some other soil of the nature of one of the others. If he have a mellow earth, or deep black mould, of the nature of the Pomfret kind, liquorice will grow fine, but slowly: therefore let him, when he digs up his ground, mix with it a good quantity of sand: this will make it grow quicker, while there is yet enough of the natural richness of the earth to feed it well. If his soil be loamy as that of Nottinghamshire; or sandy, as that of Surry, let him add mellow earth to it: he will thus make his liquorice rich, while the natural condition of the ground continues to hasten its growth. He sees the effect of manure about London, and he finds it has advantages and faults. The advantages are owing to the spirit of the dung, and the faults are owing to its rankness.

Having laid before him the reasons of every thing he is to do, I shall add what I have myself practised with success, for the raising this species; and lay down what I am convinced is the best method of improving and preparing a soil for it. I had a field of an acre, or somewhat less, the soil was a good light loam, but not very rich, and it ran near three foot deep, with  
a firm



a firm gravel at the bottom. It came into my mind to try it for liquorice, and I prepared it in this manner; I threw on thirty load of very old and well rotted dung; and forty load of mud, from the bottom of a river that ran near it. All this I plowed deep in, and repeated that operation till it was thoroughly mixed with the natural soil. This had before been of a yellowish or orange hue, and sandy, but when this addition was well wrought, in it looked black, and broke mellow, in the way of garden mould. This field bore the finest liquorice I ever saw, and I have examined most that is raised in England.

C H A P. LXV.

*Of planting liquorice.*

**L**IQUORICE, though raised in fields, requires a sort of garden culture. The spade is a more proper instrument for preparing the land, than the plow; for it requires to be broke and rendered fine, to a depth that field instruments never reach. There is this comfort to the husbandman, that if the land require a very expensive tillage; less of it serves: a few acres will yield a vast produce; and the price is so much greater than that of most other things he can raise, that there is no reason to grudge the charges. The ground is first to be dug up carefully, but this is not to be done in made soils, till the additions have been thoroughly rotted in the ground.

Supposing an earth improved as in the last chapter, by the addition of rotten dung and mud, these are to be plowed in toward autumn, and the whole is to be broke again once or twice during the open weather in the succeeding winter, for the dung will not otherwise thoroughly break and mix with the soil. If it remain in strings or cakes, it will not be easily broke by the spade; and if it remain whole, it will break in upon that perfect lightness of the earth, which is so essential to the growth of liquorice.

When the ground has lain thus the remainder of the winter, let it be dug about the middle of February. The labourers must dig every part thoroughly, no less than three spits deep; and as they lay it, they must break every lump, that the ground may be smooth and level at the surface, and in a manner as fine as sand all the way down. When the ground is thus prepared, the liquorice is to be planted. The first care is, the choice of proper sets or plants; and the second is, the placing them in the ground. For the choice all depends upon their being in good condition, and having a good bud, or eye. They are to be got from the sides, or the heads of the old roots; and their best length is a foot, or thereabouts.

Toward



Toward the beginning of March, the ground will be prepared, and the sets are to be planted in the following manner: let there be got a gardiner's line, of such length as to reach cross the ground if small; if larger, it may be removed from distance to distance. Beside the line, there is to be a setting stick, a foot and half long, with a handle like that of a spade, and a point armed with a square piece of iron in the manner of a very large spike. Let the stake to which one end of the line is fastened, be stuck into the ground a foot from the edge of the dug part, and the line let loose, that the other stake may be carried to the other end of the ground, or as far as the line will permit; then it must be stuck into the ground, at the same distance of the edge of the wrought part.

Let the planter, taking his sets in his apron, and the setting stick in his hand, begin to plant, placing the first set at half the sticks length from the edge of the ground. When he has set this, let him measure from it along the line, the length of the setting stick, and then plant another, and so on to the end. Let the end of the setting stick, which is pointed with iron, be thrust into the ground, and pressed till near the whole be in; let it not be stirred about, that the earth may not fall together. The setting stick being gently drawn out, there will remain an open hole of about sixteen inches deep. Into this a set of the liquorice is to be put, thrusting it carefully and evenly in, till the head of it where the eye or bud is, be one inch beneath the surface: then the end will be about the bottom of the hole, and a little mould being drawn over the top, the set is compleatly well planted. One being set in the rest is easy. The setting stick is to be laid along the line, its point just at the head of the set, and its other end marks the place where the next is to be planted: the length of the setting stick being a foot and half, and that being the most advantageous distance at which liquorice can be placed in the row.

This second set is to be planted in the same manner, and so on till there be a row planted all along the line. When one row is planted, the next is to be let into the ground. As the best distance for liquorice is a foot and half in the rows, the best distance of the rows one from another, is two foot and a half; and in these they should not be set directly opposite one to another, but in the chequer or quincunx order.

The first row being planted, one of the sticks is to be removed two foot and a half by measure into the ground, and then the other; tightening the line. Thus there is a row marked out at the distance of two foot and a half from the first. Let the planter take a fresh parcel of the sets, make his first hole directly



directly opposite the middle space between the first and second set of the former row. When the first set is planted there, let him lay down his stick from the top of that set, and measuring the distance of a foot and a half there plant another.

When this second row is planted, the line is again to be removed two foot and a half farther into the field, and a third row planted. The sets in this are to be placed directly opposite to those in the first; and thus every four plants of the first and third row, will have one plant of the second row in their centre. This method is to be continued interchangeably thro' the whole field, and this is what is called the quincunx manner of planting; the effect is, that every way wherein one looks at the plantation, when the stalks are risen, there appear regular rows of them the whole extent of the field, with regular alleys between them. If the farmer ask, whether this be the manner in which liquorice is planted in those places we have named, we shall answer him, that it is not. They no where allow so great a distance to the plants; but this is an error that has prevailed in every article of husbandry, and which we hope to see set aside one after another in them all.

Having given the method which experience shews to be best, we shall inform him what is the common way, if he chuse to follow it; and shall lay before him the reasons of our particular rules on each head. In this let us not appear to any too minute and circumstantial. The gardener may say we need not direct him how to draw his line; but it is not to him we are writing, it is the farmer we are informing in the several articles of his profession; and so much of the gardeners business as is needful to him, we shall convey in few words, in which he will not think us too particular.

The common way of planting liquorice is with less regularity, and at smaller distances. In Yorkshire they allow nine inches in the rows, and a foot and a half between row and row; and in some other places, they plant the sets at a foot distance every way, but without any regard to lines or rows. In the random way of planting, all that can be done afterwards to promote its growth, is to hoe the ground between; but in the method in rows, the earth may be dug at times between them, which is of the greatest advantage: and those who have a mind, may plant or sow any slight rooted crop between.

We have ordered a large space, but the growth will be large accordingly. Any one who can count, will be able to say how vastly greater a number of liquorice roots there will be in a field planted at nine inches, or a foot distance; but liquorice is not sold by number, but by weight: and we will affirm, that



the quantity of liquorice will be at the same growth much greater in the distant than in the near plantation.

The common instrument used for setting liquorice is what they call a dibble; this is the handle of an old spade, with a roundish iron point. The disadvantage attending the use of this is, that the hole is made at once too large for the set, because of the thickness of the instrument: then as the dibble is round, the earth is more apt to fall in than when it is made with a square point. For this reason, the planter when he has stuck the instrument into the ground, is obliged to work it round, in order to secure the holes remaining open. This has two disadvantages, for the hole being too big at first, is thus made much more so; and the sides are caked and hardened like the surface of a clay bank. When the set is put in, a little loose mould is thrown in about it, and a little more drawn over the top. This is all the planter does, and often this but very slightly. The consequence is the failing of many plants. The liquorice is in a kind of well; which, when rains come, naturally fills with water, and this in the cold mornings, frequent in the beginning of March, chills and damps it. Often it grows mouldy, and perishes; often it is checked in such a manner, as hardly to recover it in a long time; and very often it grows rotten in part, though it survives the damage. This damage continues with it in the whole growth.

Our instrument sets aside this danger. It need not be so thick as the dibble, consequently the hole is better suited to the slenderness of the set; and there is this double advantage in the square shape of the point, that the earth remains firmer when the hole is first made; and the angles being small, it the sooner breaks in and fills up, closing about the surface of the root. To this purpose it is best, if the wood part of the instrument be made square as well as the iron point, and with sharp edges. This, in well wrought ground, opens a hole just fit for receiving the set; every part of the earth immediately on putting it in, breaks and closes about it; so that the whole root is lodged in a bed of fine, soft, and pliable mould, and is in the midst of its proper nourishment.

#### C H A P. LXVI.

*Of the management of liquorice when in the ground.*

**T**HE sets being planted in rows two foot and a half distance, and at a foot and a half in each row; their tops furnished with good eyes, and buried with about an inch of good mould; the earth is finely to be raked, and the surface of the field left even. The heads of the young plants will quickly appear: to-ward



ward the latter end of spring there will be weeds in the intervals, and in the spaces between plant and plant in the rows. They will be less abundant afterwards, because the liquorice will be better established; but these deep-rooted plants do not draw the nourishment away from those slight annual weeds, like those other larger growths which spread out nearer the surface.

The weeds are now to be destroyed, and though this might be very easily done with a hand hoe, there will be more advantage in an instrument which cuts deeper into the ground. The succeeding operations of this kind must be more deep than this first: the best way is a breast plow, and a hand hoe of a particular form. The breast plow is to be of the common shape, only set to cut deeper; and the hoe for this use should be narrow, sharp, strong, and moderately hooked. Both should have a good steeled edge, which may be well sharpened; for the ground in a liquorice plantation is so fine and loose, that there is nothing to blunt them, and they may be worked with great ease. The breast plow is to be pushed along the intervals between row and row, coming near, but not too near to the heads of the plants; and the hand hoe is to cut up the weeds between plant and plant in each row. This is to be done first, the other afterwards. Great care must be taken that the tops of the liquorice plants are not cut off in the hand-hoeing; for the cutting off the top is a great stoppage in the growth of the root.

When the weeds are turned in, being annuals, they will almost entirely rot, and serve as manure. There will be no roots of perennial plants in the ground, for they will have been picked out in the several dressings; the seeds of annuals are continually coming in by accident, and they must be destroyed as they rise. As it will be some time before any others rise to a height, there must be care taken of them when they do. Not that the breast-plowing is to be repeated. It will be sufficient to send in labourers with the proper hand hoes, and to have them cut up all that appear, twice during the summer; or if it prove a very rainy one, three times. This may be done at little charge, and the only care is to avoid cutting or wounding the plants. In autumn, when the leaves are fallen, it will be proper to dig up the whole ground one full spit deep between the rows.

Two months after this, when all is smooth and even, let there be scattered a small quantity of very rotten dung all over the field. This will cover the tops of the plants, and defend them from the severity of the frosts, that are now to be expected; and the rains that fall afterward, will dissolve the rotted  
N 2
dung,



dung, carrying its riches into the heart of this loose earth. Thus let the dung lie till spring, and then taking a time when the earth is between wet and dry, and will work easily, let the intervals between row and row be all thoroughly well dug again one good spit deep as before. This will bury the dung among the mould, where it will work by its latent fermentation, and break as well as enrich it farther. The remainder of the growth is to be watched and hoed during summer, and at autumn the earth is to be once dug between the rows.

In this manner the liquorice is to stand three years. The profits of a field of liquorice are so large, that they over-pay abundantly the time and expences, compared with any other.

## C H A P. LXVII.

*Of the taking up liquorice for sale.*

**T**HE time liquorice root takes to grow to perfection, is two years and a half; that is, three summers and two winters. The time of gathering the roots for sale, is late in autumn. We read in Quincy's dispensatory, and other popular books, that roots are best taken up in spring, for reasons obvious to all: if they had been as obvious to the writers as they were expected to be to the readers, I suppose those gentlemen would have named them: we shall set the farmer right in this respect, by giving him directions just contrary: and shall give those reasons on which the taking them up in autumn is founded.

Two things are required in the perfection of roots, that they be full of juice, and that the juice be rich. On the first depends their good condition, and on the other their preserving that state. When they are flabby they are never full of virtue, and when being plump and full, their juice is watery, it evaporates quickly, and the roots lose their good appearance, and their weight.

To make the most of my liquorice, I have taken it up at both seasons, and tried the difference. In autumn the root is full, plump, and very firm to the touch: its colour is deeper on the outside, and the yellow within is clearer: its juice is thick, and the taste sweet. In liquorice taken up in spring the root is very plump and full, but it wants firmness: its colour is paler on the outside, and it is of a muddy but pale yellow within. It is very full of juice, but that is thin and watery, and the taste is less sweet and less rich than in autumn.

These are reasons why the autumn should be preferred for the time of taking it up: but these are not all. When taken up at autumn it will keep a considerable time without wasting: on the other hand, liquorice roots taken up in spring quickly change.



change. They lose a great deal of their weight, and will grow flabby, and wrinkled, and they will sooner grow mouldy. Experience shews this: and I apprehend the reason to be, that the juices in the root of liquorice taken up in autumn are rich, and of the nature of the plant, having in the greater part been contained in its vessels, during a considerable period of the summer. Whereas those juices which fill it so plentifully in spring are principally water, just taken into the root, and intended for the support of the stalk that is to shoot; a part of them being in due time to be converted to that rich and proper juice, which swelling the root in the end of summer contains the virtue of the plant.

These seem natural reasons, and they are confirmed by experience, for the roots are every way greatly preferable that are taken up at the end of summer. In annual plants which run to seed, and in some of those perennial ones which bear a great quantity of seeds, the root becomes impoverished after the time of flowering; so that autumn would be the worst time of all for taking up such, but they are only a few, and liquorice is not of the number. The best time of taking up such roots is when the stalk is just rising, for then they are full of those rich juices which were intended to nourish the flowers and seeds.

The farmer is to take his liquorice up when the stalks and leaves are just withered: for then it is fullest of virtue, fittest for sale, and, if there be occasion, for keeping. The best way is to have the purchaser ready before he begins to take it up, and he will find, the produce will not be less than seventy pounds an acre.

To this general and particular account of liquorice, we shall subjoin a letter written by a planter of Pomfret, in the year 1730, to shew the state of the culture and produce at that time:

“ Planters of liquorice divide the roots under two several denomi-  
 “ nations: those they call the stocks, are the tops or crown buds;  
 “ from whence the liquorice root is cut off: the runners are small  
 “ running roots, with eyes about two inches distant from each other,  
 “ and run about two inches below the surface, three or four foot long.  
 “ These runners (before planting) are cut into lengths of about five  
 “ inches long, three eyes to each plant; though two eyes, if they  
 “ are strong and good, will do.

“ If the ground has not been liquorice before, it must be trenched  
 “ over, two foot and half, or three deep; the roots in soft sandy  
 “ earth, will run six foot deep: the ground must be manured, or co-  
 “ vered over with rotten horse dung, which must lie a month, or  
 “ more, to consume, before it is dug in. A little lime is requisite,  
 “ if the ground be strong: but that is done after the dung is dug in:”



“ and the lime must be turned in about ten days before planting; or  
 “ else it will ferment, and heave and thrust the roots out of the  
 “ ground again.

“ Before planting you are to line out your ground, by a rod of  
 “ three foot long, for each bed's breadth, and within that space tread  
 “ a narrow alley, the width of a man's double feet, or both his shoes  
 “ going one by another, moving strait forwards by the line, which  
 “ makes this direction, and which is about a spade's breadth; with  
 “ which also you are to throw up the earth out of these alleys, upon  
 “ the tops of the beds; the alleys to be about eight inches deep.  
 “ Then draw up the sides of the beds with a strong rake; and (as  
 “ gardeners term it) cog the beds with it so, as to make them round  
 “ at top: which done, lay the beds in three rows; one row on the  
 “ middle of the ridge or bed; and the other two on each side, a foot  
 “ from the middle; and the buds in the rows at six inches apart; first  
 “ a stock or crown bud, and then three runners betwixt; then with  
 “ a large dibber, made of the upper part of an old spade, eight  
 “ inches in length, as is used to plant out garden beans, you are to  
 “ plant out your buds and runners; and beginning at one end of the  
 “ ridge or bed, take the bud in your left hand, and the dibber in  
 “ your right, make the depth of the hole the full length of your  
 “ dibber; then force the bud with your left hand to the bottom of  
 “ the hole; and you are to close it, by thrusting of the dibber down  
 “ again sideways, pretty near the same hole, as is done for cabbage  
 “ plants, &c. And so working towards the left hand, it will go on  
 “ apace: those who practise such works much, will do it very expeditiously.

“ The sides of the beds must be drawn up just after the buds are  
 “ planted, so as that the holes which the dibber left may be filled up,  
 “ in order to cover the roots, and keep out the wet.

“ The first year after liquorice is planted, you may sow a few onions and carrots upon the beds, not to stand, but to draw whilst young; and those but very thin: and as far as you can reach with your hand, you may sow a few radishes and lettuce; and in the autumn you may also sow spinage, which grows very fine for the spring following, and which may be cut before the liquorice grows much, especially on the ridge. The profits which arise from hence may, in this one year, be well computed at twelve pounds ten shillings an acre; which we shall make appear by-and-by, when we come to state the debtor and creditor of this commodity.

“ Liquorice at Pomfret, and other places, is never in perfection till it has stood three years; and many there be that let it stand four, if it look healthful and lively: for propagation, the runners for sets are sold by the stone, at the same price as liquorice itself is at that time; but the stock or crown buds carry near double the price. The tops are annual, growing the first year about a foot high, the second year two foot, the third year four foot; and those tops are always cut off in frosty weather; which keeps the roots from tearing. The green is best to be clipped off with garden  
 “ den



“ den shears the first year, because of its being not so strongly rooted  
 “ as afterwards it will, when it may be mowed with a scythe. The  
 “ flowers come out in August and September; but it very seldom, or  
 “ never flowers till the plants are three or four years old: they are  
 “ blue, and hang out in small tresses, like the fenna's, but above  
 “ three inches long: the stocks are like those of raspberries, only  
 “ smooth, and the leaves like seedling ashes.

“ Liquorice is taken out of the ground from Martinmas to the first  
 “ of April; but the latter season is the best, both for the liquorice  
 “ and the buds. When you take it up, sort the small from the great;  
 “ from which last you are to dress the chats with a fine knife: then  
 “ lay them in sand, one layer of sand, and another layer of liquorice;  
 “ but wet not the sand with any more moisture, than just so as that  
 “ you can hold it in your hand without running out any water; but  
 “ it ought to be rock sand, such as is dug out of pits about Pomfret,  
 “ Nottingham, and other places. You are to order the running  
 “ buds or runners in the same manner, if early taken up: but the  
 “ crown buds will do, if thrown in a heap, and covered with  
 “ mats, &c.

“ The small liquorice is, for the most part, dried on a malt kiln,  
 “ after it is chopped short with a hatchet, or some other edged tool,  
 “ and then grinded to powder in a mill; which is the readiest com-  
 “ modity of all: or else it is pounded in a trough whilst it is green,  
 “ and put into a mashing tub, and mashed with cold water two days  
 “ together: then it is to be wrung out clean, and the juice boiled up  
 “ in an iron pot to a black substance, called Spanish liquorice, and  
 “ at the place before-mentioned, where it is raised, called liquorice  
 “ cakes. The cakes they make at Pomfret are round and flat, with  
 “ a stamp resembling the antient castle of that town, now in ruins.  
 “ Within the top of which castle there are two acres of land, at this  
 “ time employed in the propagation of this noble, useful plant.

“ It is further remarkable, that one acre of the ground just men-  
 “ tioned, has yielded five hundred stone weight, which is generally  
 “ sold for three shillings and six-pence per stone, in one crop: which  
 “ must be accounted good advantage; for in three years it amounts  
 “ to eighty-seven pounds ten shillings; which is little less than thirty  
 “ pounds per acre, one year with another. Nor is the charge of  
 “ tillage so dear, by a great deal, as hops and several other improve-  
 “ ments are.

“ Before I finish this account, says this noted correspondent, I  
 “ cannot but remark, that about seven years ago all the liquorice at  
 “ Pomfret was monopolized and engrossed by a set of merchants, &c.  
 “ But the engrossers, by sending too great a quantity together,  
 “ found, to their cost, that it heated and smoaked like a hay-reck  
 “ put up too green. Which I mention by way of precaution to those  
 “ that raise great quantities, who ought not to lay above two hun-  
 “ dred stone in a heap; for though this may seem a great quantity,  
 “ yet a much larger has been taken up, and transported, or kept in  
 “ one parcel.



“ When liquorice is to be transported, all that is designed for pre-  
 “ sent use is tied up in seven or fourteen pound bundles, neatly rolled  
 “ up, and bound with packthread. But the only way to be taken is  
 “ to send it by water, and then to lay it in dry sand, or any other  
 “ dry soil, a layer of liquorice and a layer of sand; so that the sand  
 “ runs all over it, and amongst it; and so an apothecary may keep  
 “ it good for a twelve-month in his cellar. As for transporting of  
 “ the roots for planting, if the small eye roots, or runners and buds,  
 “ were so transported in sand, it were better for them, than to be  
 “ sent naked; especially if it be a great way, and they are like  
 “ to lie out of the ground long. If for a journey of fourteen days,  
 “ they may be sent in bundles cut ready for planting; but if they  
 “ are to be out of the ground longer, then they mould and rot.  
 “ They should not be mixed head and tail, if you send them any  
 “ distance; but must be bound up in little bunches, as above, and  
 “ tied all one way, for readiness of planting. As for the crown  
 “ buds, they may be sent by sea, with a little sand to them, being  
 “ much hardier than runners are.

“ At the town of Pomfret are about fifty acres of ground, called li-  
 “ quorice garths, many of them in small apartments, which entitle  
 “ the possessors to as many votes for members of parliament, as they  
 “ are possessed of those small parcels of land. All which causes the  
 “ land tillage to be very dear, the common labourers having one  
 “ shilling per day, and two drinkings, which amounts in all to at least  
 “ fourteen or fifteen pence per day. But there are many other places,  
 “ where it is found by experience, that there is as good liquorice  
 “ raised, as at Pomfret, and where men and buds are very easily  
 “ procured.

“ As to the expences of planting and preserving of an acre of  
 “ liquorice, the price of the roots differ in proportion to the price  
 “ that liquorice bears the year you send for them: when liquorice  
 “ gives three shillings a stone, fourteen pounds to the stone, then  
 “ crown buds give five or six shillings per thousand; and runners, cut  
 “ into lengths, and tied up in bundles, give three or four shillings a  
 “ thousand.

“ Old planters of liquorice reckon that eighty thousand of plants  
 “ will plant an acre: but computing twenty plants to a yard, and four  
 “ thousand eight hundred yards to an acre, then an acre requires  
 “ ninety-six thousand, at one hundred sixty square poles to an acre,  
 “ thirty yards to a pole square, and twenty roots to a yard; as may  
 “ be seen in the example.

160 Poles in one acre,  
 30 Yards in a pole,

---

4800 Number of yards in an acre,  
 20 Roots to a yard,

---

96000 Total of roots to an acre.

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“ Now



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“ Now as they generally plant one fourth of stock buds, and three fourths of runners, then there will be required,

|                                                                                    | l.    | s. | d. |
|------------------------------------------------------------------------------------|-------|----|----|
| 24000 Stock buds, at 5 s. per hund. when cheap —                                   | 6     | 0  | 0  |
| 72000 Runners, at 3 s. per hund. —                                                 | 10    | 6  | 0  |
| The charges of preparing the ground will be about —                                | 4     | 0  | 0  |
| Weeding, the first year, about —                                                   | 4     | 9  | 0  |
| Weeding the second year, for it is not hoed, but weeded by the grub and hand, at — | 3     | 0  | 0  |
| The same operation the third year, at —                                            | 3     | 0  | 0  |
| The taking up and bundling the last year, at —                                     | 3     | 0  | 0  |
|                                                                                    | <hr/> |    |    |
| The charges in all, about —                                                        | 33    | 15 | 0  |

“ So that from what goes before, and what will by-and-by follow,  
 “ it is plain that an acre of liquorice will, one year with another, as to  
 “ the debtor and creditor of it, stand as in the under-written scheme,  
 “ the whole being taken at an average for three years,

## DEBTOR.

|                                                                                   | l.    | s. | d. |
|-----------------------------------------------------------------------------------|-------|----|----|
| Three years rent of the ground, at 5 l. per acre —                                | 15    | 0  | 0  |
| The whole charges of planting, weeding, and gathering                             | 33    | 16 | 0  |
| To the vicar for tythe, at 2 s. per pound, i. e. 10 s. per acre for three years — | 1     | 10 | 0  |
|                                                                                   | <hr/> |    |    |
| In all —                                                                          | 50    | 6  | 0  |

## CREDITOR.

|                                                           | l.    | s. | d. |
|-----------------------------------------------------------|-------|----|----|
| Five hundred stone of liquorice, at 3 s. 6 d. per stone — | 87    | 10 | 0  |
| A crop of onions, &c. the first summer —                  | 1     | 0  | 0  |
| Some winter's crop for that year —                        | 2     | 10 | 0  |
|                                                           | <hr/> |    |    |
| In all —                                                  | 91    | 0  | 0  |

## DEBTOR and CREDITOR ballanced.

|                          | l.    | s. | d. |
|--------------------------|-------|----|----|
| Debtor to rent, &c. —    | 50    | 6  | 0  |
| Creditor in goods sold — | 91    | 0  | 0  |
|                          | <hr/> |    |    |
|                          | 40    | 14 | 0  |

“ Which is above sixteen pounds a year per acre clear profit, for  
 “ the raising of liquorice.

“ To finish this account it is plain, from what goes before, that  
 “ fifty shillings an acre is allowed for the first winter's crop; but if  
 “ the ground be sowed with Michaelmas onions, carrots, lettuce, &c.  
 “ there seems to be no reason why all the three crops may not be  
 “ worth half as much, at least, as the one summer's. And perhaps  
 “ the



“ the same methods might be taken in other winters, when the stalks  
 “ are gone, as used to be done on beds, at least, as it's used in the  
 “ alleys of asparagus plantations. And by this it appears, that if a  
 “ planter was possessed of an hundred acres of liquorice, and had  
 “ a vent for it, it would bring him in near two thousand pounds a  
 “ year, clear of all expences. But an hundred acres is too much for  
 “ one man, or in one county; and so no more of that.

“ And thus, Sir, have I given you as good an account as I could,  
 “ concerning the raising of liquorice at Pomfret, at least as good a  
 “ one as the time you gave me would allow; though I am, I think,  
 “ pretty sure that there is little or nothing omitted which is material,  
 “ and absolutely necessary to be known in this affair. I wish you  
 “ good success in all your undertakings,

And am, your, &c.

J. P.

“ P. S. Our liquorice garths take up so many hands, at the time  
 “ of year, that there are scarce any labourers to be got, at any  
 “ rate, for other works.”

## C H A P. LXVIII.

### *Of saffron.*

**S**AFFRON is a little plant, raised for a small part of its flower. It has a singular aspect when growing; a field of it, at the season of flowering, looking like a garden. It is of the nature of those flowers called crocus, from its Latin name; and it is not unworthy a place among the ornaments of a garden. The root is roundish, single, and large. It is one of those called bulbs, in all respects resembling that of the garden crocus. It is covered with a brown skin, and has a tuft of fibres from the bottom. The leaves are numerous, narrow, and long, like grass, and of a dark green colour. The flower is single, it rises from the midst of the root, and stands but a little height above the ground, but it is very large. The colour is a blueish purple, and in the midst of it rise those particular filaments, or blades, which are the saffron.

We have given a particular account of the flowers of those several plants raised for use in fields, and heretofore described; informing him of the nature and office of their several parts. This must not be esteemed a matter of useless nicety: we are to give the same account now of the flower of the saffron, and without so much insight as the farmer has by means of the former descriptions, in the nature of the several parts of flowers, it would not be easy to acquaint him what the substance we call saffron, which sells at so great a price, and for the sake of which the plant is cultivated, truly and properly is.

The



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The flower of the saffron plant stands in a kind of husk, formed of one dry piece. The flower itself is formed of one leaf, which at the bottom has the shape of a tube, but in the body is divided into six large oval parts, equal in size, and forming a kind of hollow vessel; within this hollow rise three filaments, these are shorter than the flower itself, and have each a dusty button at the top, of the shape of an arrow head. In the center of these, and of the flower, grows the rudiment of the seed vessel: this is of a roundish form. On the top of it stands one filament, which is of the length of the three just described, but instead of a single button on the top, this has there three large blades, which are rumpled and notched along the edges. These are the saffron. Some have said saffron is the filaments of the flower, but that is an erroneous expression; the filaments are properly those three threads which rise from the bottom, and support the buttons, in which is contained the dust for impregnating the young fruit; but these three blades are distinct from them in shape, nature, and office. They grow from the top of that single thread which rises from the fruit, and their business is to receive the dust from those buttons of the filaments, and to convey it to that thread through which it is to reach the body of the fruit, and penetrating into its several cells, to impregnate the seeds. The twisted, curled, and notched form of these three blades renders them very fit for the purpose of stopping this fine dust, as it is shed on the bursting of the buttons of the filaments. The farmer's care reaches no farther than to the ripening of those three blades: the time when these are in perfection is the period for gathering; and that is just before the buttons of the filaments burst to discharge their dust.

Saffron is a native of many parts of Europe, but not of England, though it lives so happily with us by culture; that the English saffron is allowed to be the finest in the world: and we are supposed, from the excellence of that article, to be able to make the famous Venice treacle, in as great perfection here, as they can in Italy. They have the advantage over us in the vipers, which are one ingredient, and are more full of virtue as well as of poison in the hotter countries, but we have as much the preference in saffron.

The Alps and Pyrenæan mountains are the places where saffron is most frequent wild; we have a plant not unlike it wild on the sides of some of our Welch mountains. Dr. Dillenius has given a figure of it, in his edition of Ray's Synopsis of the English plants, but it is not the same with the true saffron: its flower, which is of the size of that of wood sorrel, grows on  
a stalk



a stalk whereon are several short leaves, this shews it to be essentially different. All plants thrive better on being removed from a poorer to a richer land. This is the case with saffron; for when brought from the bleak and barren mountains of other parts of Europe, to the rich and sheltered plains of Britain, it out-grows by many degrees its natural condition.

## C H A P. LXIX.

*Of the proper soil for saffron.*

**S**AFFRON is cultivated but in few places. Some parts of Essex, and the neighbourhood of a town thence called Saffron Walden, in Cambridgeshire, are in a manner the only spots of this fertile island, where it is raised. An attempt was made not long since in Surry, but without success: on enquiring of Mr. James Ogilvie, who was a principal proprietor, I found the ignorance of those who undertook the work, was the cause of the miscarriage. Saffron is a nice article, but with due care it is less hazardous than many others. It delights in a warm flat situation, but will thrive better in open fields than inclosures. The fences used about it are to be constructed accordingly.

The proper soil is a rich light earth, improved by manures; it may easily be too wet or too rank, but it cannot be too much enriched by mellow dung, or too much prepared by tillage. A very rich loam is a good natural soil; or a mellow earth in which there is some quantity of sand: for that soil alone is too often damp; and this is a fault of the worst kind, as it will rot the roots. Care should be taken also to examine the bottom, for a less proper soil, with a good bottom, will favour the growth more than a better, with what is bad underneath.

For the culture of liquorice there is required a great depth of good mould; and a hard gravel is the best bottom: for saffron this depth is not needful; but the nature of the bottom is of great consequence. A hard gravel is best; and the worst of all others is clay. If it happen that this lie under a deep soil it is very prejudicial, but if it be covered only with a thin coat of good earth, though that coat would be sufficient otherwise, yet with the clay bottom it will by no means answer. The reason of this is, that clay bottoms hold water, which is prejudicial to saffron. Next to a gravel bottom, chalk is the most favourable, this is the bed that lies under the soil in many places about Saffron Walden.



C H A P. LXX.

*Of preparing the ground for saffron.*

**S**AFFRON requires to have the ground prepared at some expence. Indeed the richest crops in general demand the greatest preparation. Open fields do better for it than enclosed countries. In those places, the best method is to take a piece of ground that has been fallowed, and that has had a crop that has not greatly exhausted it before. No growth exhausts land less than barley; wherefore, let the farmer prefer such land to any other.

The saffron is to be planted in the beginning of July, but the preparation of the ground must be begun in March. Toward the end of that month let him begin by plowing, and that in a particular manner. The ground must be plowed deep, and the furrows drawn very close to one another. This brings all the parts of the soil together, and gets them all quickly into a perfect and good tillage. When the soil is thus broken, it is to lie six weeks to enjoy the benefit of the dews, rains, sun, and air; and after this is the time of laying on manure. This must be well rotted dung, if it were fresh, it would not mix with the soil; and it would be too rank for this tender growth. The dung and soil will readily mix together; and it must be the farmer's chief care, that one parcel of the ground have no more dung than another. The quantity of dung is five and twenty load to an acre. The labourers must spread it equally over the ground, and it is then to be plowed: this answers the purpose of the spade in gardening.

In this condition the ground is to lie till the third week in June. And the last preparation for the root is then to be made by plowing again in this manner. The whole is to be carefully turned and made fine, and between every breadth of a pole, that is sixteen feet and a half, there is to be left a broad trench. This serves to divide the lands, and for a place to throw the weeds. The ground is thus laid out for the crop, and nothing remains but to defend it from cattle. Hedges are not required, because a slighter fence will serve; and the saffron will thrive the better for not being sheltered. The best fence is a range of hurdles; or a slight dead hedge; it must be tight at the bottom, for hares are fond of eating the saffron.

C H A P. LXXI.

*Of the choice of roots for planting.*

**S**AFFRON roots are always to be had in abundance, for it encreases greatly. Once in three years every planter  
takes



takes up his roots, and an acre yields him from twenty to thirty quarters of clean ones. These are sold by the bushel. The owner picks out the best before he sells any to his neighbours, and it is the business of the purchaser to get after this as good as he can.

The first article is soundness. Some sell them as they are picked up out of the ground; but this is a slovenly and careless method often injurious to the owner, and always hazardous to the purchaser. We shall advise our planter to have his roots picked and cleaned for himself; and to purchase of such as have used the same method. If he cannot get such, he must take them as they run, but they ought to come so much the cheaper; and he must pick and clean them, before he commits them to the ground. We would have him proceed with certainty, and there can be none where many of the roots may fail.

Roots ought to come much cheaper when bought rough, not only because many may be bad, but there will be a great deal of dirt, waste matter, and old skins that fill up the measure. However, if the price be proportioned to the condition, and care taken afterwards in examining and cleaning them; sometimes it may prove the best purchase, for the careless owner may thus sell his best roots, and the new planter may get such as he could not have bought otherwise. The roots of saffron are judged of by their size, weight and shape. The largest and heaviest are best: let the buyer avoid little light skinny roots; and when he looks over his purchase, let him throw out the lightest; for it is better to lose them, than to be disappointed by depending on them. Those are best which when picked have the smoothest and brightest coat. After this let him press some of them gently between his finger and thumb, and break others. In pressing they should be found firm and springy, for when flabby, they are in a condition of decay: when broken, they should be full of a rich fresh juice.

There is a great deal in the shape of the roots. The large and fine roots are all rounded or flatted, and the small ones should be in some degree of the same form. They never can be so plump, so round, or so regularly shaped as those full grown ones, but the more like them the better. Many are long and run to a point. The people in the saffron counties distinguish them by the name of spiggots; and always reject them. The interest of the farmer is, that his plants flower the first year, and the pointed roots never do so. The others often will flower when very small: so that the planter need not reject a very small root, provided it be of a right shape, and fresh, plump, and thriving.



*Of planting the saffron.*

**W**HEN saffron roots were more scarce, the planters used to set them at considerable distances; but this is not essential to such a slight bulb. This being now understood, and the roots plentiful enough, they are planted so near that about four hundred thousand are required for an acre. Sixteen quarters contain about four hundred thousand, and this is the most profitable quantity to plant.

The farmer may make the trial with a single acre. If he chuse to keep more land in this growth afterwards, three acre-pieces are the most proper, for they are easiest managed. The instrument used for planting is a spade made narrower than the common kind, and slighter; with a clean blade and a sharp edge. This they call a spit, or a spit shovel. To every man who has his spit shovel for opening the ground, there are to be two women with roots in their aprons. The man goes first, and with his spit raises three or four inches of earth, and throws it about half a foot before him. The women follow, and dexterously taking the roots one by one out of their aprons, place them in the farthest edge of the trench, which he makes in the manner already mentioned. The distance of the roots in the row is three inches: custom will lead the women to do this very equally.

When one row is laid in, the spitter prepares for another, and at the same time covers these. He works crosswise of the ridge, and when he has thus gone once a-cross it, and the roots are in, he begins from the edge where he is, and works back again. He makes a new trench as the first, and the earth he throws up he turns in over the row just planted. All the care is, that he begin his trench at such distance from the edge of the last, that it may be as far from the roots to be planted in the new one to those in the other, as it is from one to another of those roots in the row: for the meaning of his work is, that there be an edge of a trench left by his second course a-cross the ridge, just three inches distant from the first planted row. As he turns the earth of this trench over the roots of the other, he will leave the edge that is to be planted just in a way to be covered in by the earth of the next trench, and so on. This is what he is to do at every return, crossing the ridge at every three inches till the whole be finished.

The women follow him as in the first, and leave the roots planted, but naked, for him to cover; the next trench affords the mould for covering them; and when the spitter has gone through



through one ridge he begins upon another. When he has done, all lies even, and the ground is planted with roots three inches distant every way. His care must be to cut exactly and evenly to the true depth, and by that means to leave a level, sound, and undisturbed bottom for the roots to stand upon. If there be any haggling it will hurt their growth; and as he knows on which edge the roots are to be placed, let him be careful to keep the bottom particularly even there. A good workman will have a bottom as even as if it had been flatted by art.

The setters must place the roots directly and evenly upon their bottom. The great care in the art of planting lies there, and if once so placed, the earth that is so light in itself, and falls so lightly over them, will not disturb them. When things are done in haste, they are seldom done with care. The planters in the saffron countries are very ready and expeditious, but the eye of the owner should be upon them to see they do all properly.

### C H A P. LXXIII.

#### *Of managing saffron while in the ground.*

**T**HE roots being got into the ground in the beginning of July, the planter has no occasion to think of them for two months. They are to be left to nature; gradually to swell, and to open those pores at which they are to take in nourishment, to shoot some fibres, and to receive the juices of the earth. In the beginning of September the ground may be cleaned, and broke on the surface. This will assist the pushing of the shoot; but if it be done too soon, the earth that by its lightness would have assisted in the forming and sending up the shoot will too soon grow sad again; and if the operation be deferred till the shoot is got to some length in the ground, though it does not appear above it; the instrument will cut them off.

In the beginning of September let the planter examine the state of the roots by opening the ground. Let him take up two or three in different places, and he will soon see whether they be in a condition for the operation. He must make the trial in different parts of the ground, because from particular accidents; if he made his trial only in one place, he might be deceived in judging from that of the whole field. The exact condition of the roots for this operation, is when they have made their shoot upwards, and it looks fresh, juicy and white, and has its point within an inch and a half of the surface. This is the exact time. It will be out of the way of the instruments; and yet so near the surface, that the dews and rains will



will enrich and feed it so richly, and a few days more bring it all over the field up above the surface of the ground.

The operation to be performed is a careful handhoeing: The hoes should be of the usual breadth, but a little stronger. Caution must be given the hoers to tread lightly, and cut carefully. Their business is to cut an inch or less into the ground, destroying all weeds, and loosening the surface. The hoers are to be followed by rakers, who must have the same caution of treading lightly; and must rake off the weeds cut up by the hoers, into the deep furrow or trench made at the edge of each land. The rakers level the surface, so that when this is over, the whole field looks again like a garden; with the borders new dug up. If there come gentle showers, the owner may account himself happy. His field will remain but a little while naked; and he will see the fruit of his industry, in a regular healthful crop.

C H A P. LXXIV.

*Of the gathering of saffron.*

THE husbandman will understand the reason of our caution, not to wound the top of the shoot, when he shall be informed that this is the rudiment of the flower itself. An injury to it would be irrecoverable. The practice of hoeing is the more essential, because there is nothing to receive the nourishment it supplies but the flower, and no part of the flower shews so plainly the effect of a supply, as those three blades which are the substance called saffron. They will shew themselves in the flower, however poor the plant may be; but they will be thin and light in poor ground, and they will grow fat, thick, and rich, in proportion as the soil is better, or more improved by art. Therefore taking all means to supply the roots with nourishment in the beginning of September, when they are rising to flower, is of all things the most essential in the management of saffron; not only the weight, that is, the quantity of the produce, depends upon this fatness of these blades, but its virtue, and its good appearance in the cake. The price of saffron, as well as the quantity, depend upon this article.

A few days after this hoeing will shew the young shoots of the crop, and that their regularity will make a very pretty appearance; a little time more will shew these spires all opening into flowers, and then the prospect is agreeable indeed. The saffron plant is one of the flowers called crocus's; and is inferior to few of them in beauty. The field is, according to our method, planted with all the regularity of a garden; there is



not left the leaf of a single weed by the hoers and the rakers ; and the flowers now open in all their glory. A sight pleasing in the greatest degree to the owner, who with the beauty sees the advantage. As soon as the flowers are open they are to be gathered, and the threads are to be picked out and separated. This is a business that may be performed at home ; therefore 'tis not necessary to attempt it in the field. The whole flower is to be gathered there, and the rest to be done afterwards. The sun and air have a great effect upon the flowers, and even upon the leaves of plants ; we see them firm and plump in a morning, when they are full of the refreshment of the dew ; at noon, if the sun have had power, they flag and grow lank ; and toward evening they begin to recover their look of health and vigour again.

This natural change affects nothing more than this plant ; and no part of this so much as the blades within the flower. These are plump in the morning ; they grow thin by noon, and they do but indifferently recruit themselves in the evening, the completion of this is reserved to the dews of the night : therefore early morning is the only time in which they are perfectly fine. The planter must send in a proper number of hands at day-break as soon as the flowers of the saffron appear, and these must gather till about nine in the morning. All the flowers of saffron in a field, do not appear together : little accidents occasion some plants in the same field to be earlier, and some later in flowering. This is a great advantage : it would be impossible, if they all burst forth together, that they could be gathered properly : but these accidents protract the time several days ; so that the flowers of one morning being gathered, there is a fresh supply open for the next.

There is no exact degree of opening, at which these flowers must be gathered. The saffron is best in those which are just separated at the tops, or are just opening into the full bloom, but they may be gathered before or a little after this period. Those flowers which distinguish themselves by their full colour, whether they are fading or not quite opened, are to be gathered. Each of the gatherers must have his basket on his arm, and no other preparation is necessary. Drunken labourers are at all times to be avoided, but they are to be most dreaded on this. There is danger, that in gathering such a part of the saffron as is fit, more may be trodden down. The want of light, and the carelessness of the gatherers, are the two things to be feared. This work falls out at a time when people are sober, if they ever be so ; but there are such thorough sots that they should be examined. Though they are ready at day-break  
they



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they must not be sent into the ground till it is well light: they are then to be posted in different spots; to gather all the ripe flowers about them.

As these people pick up the flowers one by one, they are to drop them lightly into their baskets. All the art of gathering is, that they lay hold on the lower part. The flower comes off more entire when taken by this part; and not touching it near the top, the useful blades which grow in the upper part, are not injured by the pressure. Toward nine, or half an hour after nine, the gatherers should desist. The great care is to adapt the number to the work. If they be too few they must stay till they have done, even if it keep them within an hour of noon; but as there is a loss to the saffron in this, the planter should take care to send in a larger number next day. The next morning all are to be ready at the same hour, and the gathering is to be performed in the same manner. This is to be continued regularly till the whole quantity of saffron has flowered, and all its produce has been regularly collected.

### C H A P. LXXV.

*Of the picking the saffron out of the flowers.*

**E**VERY morning there will be a quantity of flowers brought into the house. The baskets of the gatherers, which have been lightly filled, are to be as lightly emptied, that no injury may be done to those three blades, which are the essential part. The entire flowers are to be scattered over a large table, round which several persons can sit to pick: four forms are the best convenience for that purpose, and every picker should be allowed free room for his arms. The same people who were employed in the morning as gatherers, may be set to work, during the rest of the day, in picking: he is an ill manager, who does not contrive to have all the saffron gathered in the morning, picked during the day.

The method of picking is to take the flower by the bottom, between the thumb and two fore fingers of the left hand, and laying hold of the string that rises from the embryo of the fruit, just below where the blades of saffron grow from it, between the thumb and fore finger nail, to nip it off there; this part is to be laid by, and the rest of the flower thrown away. From time to time a sweeper should clear away about the pickers feet, taking off the flowers they have thrown down; and every picker should have his or her own dish, that the owner may see each does his part in the business, and that all do it right. I have seen great irregularity when several people picked into one dish, one laying the fault, when discovered, upon



another; but when each works separate, though all are at the same table, the sense that he is to answer for what he does, will keep him diligent.

The part to be picked out, being the three blades of each flower, there may be faults on either side. That of carelessness in servants is most frequent, they not taking out the whole of these blades; and on the other hand, the avarice of the master makes him sometimes insist on their taking out more, nipping off a piece of the filament to which they grow, along with them, by laying hold of it too low. The first defrauds him of a part of his quantity, the other debases the value of the saffron. To prevent injury from the first, the owner must have his eye upon the work; and sometimes look into the picked saffron in the dishes, and sometimes into the flowers thrown down upon the floor. There is a certain way of knowing when the work is rightly performed: this is by observing the bottoms of the blades. The design is, that these be all nipped away together, by pinching off the top of the filament just below where they are inserted. If the three blades do not hold together, they have been taken off too high, and he has lost a part of his saffron: if they have been taken off too low, he will see a long string to which they grow, hanging from their base; by which he knows he has more than he should, to the damaging, in some degree, the beauty of his saffron. The injury this way is not very great, for the colour of the filament, though fainter, is not distinguished easily, when it has been pressed and made up in the cake; but the buyers of this commodity are now so good judges, that the planter cannot be too careful.

The pickers should have long and sharp nails on the fore finger and thumb of the right hand, otherwise they pinch the saffron off in an awkward bungling manner, always crushing the filament to which the blades grow, and too often the blades themselves. The people who expect to be employed on this service, in the saffron countries, know the use of preserving these nails long and in good order; and they commonly do it at the season: but as every little article in this is of consequence, the owner will do well, especially when he shall propagate saffron in a county where the labouring people are not used to it, to bespeak his gatherers and pickers in time, and caution them to let these nails grow for the service: it will answer their purpose as well as his, for they will go through their work with more ease, by being thus provided against the time, with this natural implement. Let the owner look carefully into the flowers they throw down. If he see the filament left at its whole length, or very nearly so, and its end pinched off clean and sharp



sharp without bruising, he need not look into the dish of that picker to see his saffron: 'tis certain from this, that the valuable part is taken out clean, entire, and well. If he find parts of the three blades remaining on the top of the filament in some of the flowers, and a great deal of the filament nipped away in others, he will know, that in the one case he is defrauded of a part of his produce, and in the other, that he has a disadvantageous addition. This careful inspection will keep the people at their duty, and make those honest through fear, who would not be so in principle. None but he who has observed it, can conceive the difference there is between servants who work under the eye of a careful master, and those who are in the pay of a negligent person, who leaves them to themselves.

CHAP. LXXVI.

*Of the drying of saffron.*

THE manner of picking saffron for one day, is applicable to every day. The people are sent out to gather the flowers risen in the morning, they unload themselves two hours before noon, and are employed in picking out the saffron during the remainder of the day. Thus they are to proceed till the whole crop be gathered, and the whole quantity of the blades picked out. This is the saffron, we left it in their several dishes, separated as clean, and kept as pure as the nice eye of the owner could obtain it, and we are now to inform him in what manner it is to be prepared for sale. These blades of saffron would soon dry if left to themselves: this would rob them of a part of their virtue; and of a great deal of their weight. The owner is to sell them by weight, and will have a price proportioned to their condition. The method of preparing is by pressing them together into large cakes, with the assistance of a slight degree of heat. This forms them into compact masses, which remain long in a damp or soft condition, retaining the full flavour and colour they had while in the flower. It is thus the druggist or dealer expects to buy them; and he will always give a price proportioned to the degree of perfection with which this work has been performed. All that regards the management of saffron is nice, but this is the most nice of all. Some heat is absolutely needful, but ever so little beyond the due degree is hurtful; and a little carelessness in the management may burn the saffron, after which no art can bring it to be worth any thing.

The drying of saffron is effected by means of a kiln, but this is of easy structure, and small. We have said extream care is necessary, very little beside care is necessary; therefore



let not the owner, who reasonably expects so large a profit, spare that. The kiln should not be erected in a fixed manner, because it will be convenient to move it from place to place; and the degree of fire to be used is so moderate, that there is no need of hard or heavy materials.

Let the husbandman provide a large, broad, and thick plank. Let him support this upon four strong legs, that it may stand firm, but not fix these to the floor, nor the plank to the wall; let it be as a moveable table, that he may carry it any where, as he shall have convenience or occasion. The legs are to be short, and so contrived that they may stand very steady. The outside of the kiln is to be made of eight pieces of sound wood, about three inches thick, in form of a frame upon the plank. This frame is to grow gradually wider, all the way from the bottom to the top, which is to be done by setting the pieces sloping. Its best breadth at the bottom is a foot; and it should be near twice that at the top. The height should be about equal to the width at the top. Two and twenty inches high, and two and twenty inches broad at the top, and twelve inches at the bottom, is the usual dimension of the kiln for saffron in Cambridgeshire; and this size and proportion is so convenient, that it would be idle to think of making any innovation. On the foreside of this frame there is to be a hole eight inches wide, and about four inches above the surface of the plank. The use of this is to introduce the fire. And over all the rest there is to be a covering of laths, of the best and evenest kind that can be procured; and care is to be taken to lay them regularly, evenly, and pretty close together; they are to be nailed to the frame, and then they are to be plaistered over on both sides. The planks are also to be covered very thick at the bottom with the same plaister, which when dry makes a kind of hearth and sides for the reception of the fire. A hair cloth is to be stretched over the top or widest part, which is what they call the mouth of the kiln: this is to be fixed to the sides of the frame, and also to two rollers, or moveable pieces of wood, which are turned by a kind of wedges, and serve to strain and tighten the hair cloth on occasion.

When the kiln is thus far prepared, let the husbandman lay in readiness a couple of smooth and thick boards, a little larger in length and breadth than the top of the kiln; and with these a clean thick blanket, and a quire of white paper. Let a quantity of small and fine charcoal be set by the kiln, to make and keep up the fire. This must be clean and free from knots, and in this choice of it a great deal of danger is avoided. The  
plaistered



plastered bottom and sides of the kiln will very well bear the due quantity of fire for this purpose, nor will they be injured, whatever be the condition of the charcoal : but this is not the case with the saffron ; that requires not only a very gentle, but a very equal heat : it is easily damaged ; and no fuel will keep up so equal and quiet a heat as fine even grained charcoal. Such as is knotty, and of the nature of what they call in London *old coal*, is fiercer, but that quality is not wanted on this occasion : it burns irregularly, the knots being always less charred, by reason of their hardness, than the intermediate parts. The fire, with the same fuel, is stronger at some moments and weaker at others, which will affect the saffron irregularly, and the knotty part often crack and fly, the sparks from which will be apt to burn the hair cloth, and do other damage.

Every thing being in readiness, let some charcoal be lighted, to put into the kiln : then let half a dozen sheets of paper be evenly laid upon the hair cloth : upon these let the picked saffron be laid three inches thick, and spread very regularly, just as it comes from the pickers hands, and without any pressing ; that is to come afterwards, when the saffron is more in a condition to bear it, and is to form it into those thin and compact cakes in which we see it. When the saffron is thus spread to a proper thickness upon the papers, more sheets of the same paper are to be spread over it ; and then the blanket is to be folded and doubled, so as to bring it to a little more than the size of the top of the kiln. This blanket is to be laid upon the upper range of papers, and the fire is to be then put into the kiln. A few pieces of ready lighted charcoal are first to be put in at the square hole in the front, and upon and about these are to be laid more pieces, all of them small : for large pieces burn unequally, so that it is never possible to keep the fire at any regular standard.

Chemists know this article of keeping up a regular fire by small charcoal perfectly, and all others should learn of them on this occasion. When they have nice operations, they first break their picked charcoal into pieces of the bigness of a wallnut. And this is the proper method of acting in this article of drying the saffron. The quantity of fire must be proportioned to the quantity of saffron. 'Tis impossible to convey any notion of this in words ; all the terms on this occasion being comprised in two, great and little. The fire must be of the latter kind, but yet it must be enough to affect the saffron ; the best method of acquainting the unexperienced, is to tell him what is the design of it. The thing to be done is not the drying the saffron at once, for that would utterly spoil it ; but to give it such a



degree of heat at first, as will dispose it to grow damp. This is a certain consequence of its being warmed and covered up, and this is what the people in the saffron countries call sweating of it. This is the degree of heat required, and hence the owner will judge what is to be the strength of the fire. He will find, by the condition of the whole, whether it be right. The first hour is the most critical of all the time of drying. The fire is required to be stronger than at any other time, though then but moderate. What is called sweating of saffron, is raising some moisture out of the blades, by a gentle heat, which being detained by the covering of the paper and the blanket, is returned upon the saffron again, and there works by softening and mellowing the blades; so that they are, after a time, disposed to unite by a gentle pressure, and to form together one compact cake.

When there has been such a fire as serves properly, continued for half an hour, the board we have directed to be in readiness is to be laid over the folded blanket, and a large weight is to be laid upon this. The mellow and soft matter is thus pressed by degrees; and presently, from a body of three inches thick, as it was at first, is reduced to an inch in thickness. The fire is then to be a little lessened. The heat and pressure now operate together, and the cake continually becomes thinner and more compact, and is kept in a condition of moisture wherein it blends perfectly in all its parts; so that it advances by degrees, toward the condition wherein it is to be finally made up. When this degree of heat has been kept up an hour, the husbandman is to turn the cake of saffron. This he is to do in the following manner. The blanket and board, with its weight, are all to be taken off; and the papers are then to be raised up, loosening the saffron where it sticks to them: then the papers are to be laid on again, covering the cake as before, and then a thin board is to be thrust in between the hair cloth of the kiln, and the lower parcels of papers: these are what were first spread upon the hair cloth, and they now lie close under the saffron. When a board is compleatly got under these papers, the cake of saffron lies upon it, and may be easily turned. This is to be done carefully, and the whole, with the new spread upper papers, is to be laid again evenly upon the hair cloth of the kiln. When that is done the board which served for turning it is to be taken away, and the blanket, doubled as before, is to be laid over it; the board for pressure is to be laid upon that, and the weight put upon it.

Every thing is now in the same condition as at first, except that the cake is turned, and the same degree of heat is to be preserved



preserved in the kiln, that there was the last half hour, which is something gentler than the first. In this manner the cake is to lie one hour: at the end of that time the weight, board, and blanket are to be taken off, and the cake is to be raised, freed from the papers, and examined. If there be no mischief done now, the danger is over, for these two first hours have all the hazard; for the rest of the time, less heat is needful, and all the care necessary is frequent turning. We will suppose the cake of saffron well managed, and to have passed through the operation of the two first hours. It is then to be turned and laid on again, and a gentle heat kept up. This heat must be preserved as equally as can be for two and twenty hours, and the saffron must be turned every half hour during that time; when this is over, it is in the right form, and is fit for sale. It is to be wrapped up in a bladder, oiled on the outside, and that is to be again wrapped up in leather, and then the whole in flannel. This care keeps it in the due condition, till required by the purchaser, it remaining moist and tough, without the loss of colour, taste, weight, or virtue. This is sufficient, if there be a ready market upon the spot; but if the owner be obliged to keep it some time, the proper security is to put the whole parcel thus wrapped up and covered, into a leaden or tin box: in that way it will keep years.

## C H A P. LXXVII.

*Of managing the latter gatherings of saffron.*

**T**HE husbandman is to send gatherers every morning, so long as any number of flowers appear upon the field; and according to various accidents, there will be some plants forwarder and some later than the generality of the rest, by several days. On this depends a distinction between the better and a worse kind of saffron. Those flowers which open before the generality of the others, are finer than the rest, for their forwardness is owing either to the strength of the roots, or the particular richness of the spot. The fineness of these flowers consists in the largeness and plumpness of the chives; and these may stand to be gathered with those of the succeeding morning, if not enough to send for alone, because those rich blades will support themselves in good condition for some time after the flower is open. These are the richest kind of saffron, and they are mixed with the rest, giving a value to the whole.

On the other hand, there are quantities of the plants which standing on poorer spots, or under shelter, or from the smallness of the roots, flower later than the generality. As the blades are in the more forward plants richer than the rest, they  
are



are in these poorer, and it is not to the advantage of the owner to mix them with the rest of his produce; because these would diminish the price, more than their quantity would make amends. He is to look upon these late gatherings as a particular kind of saffron, inferior to the rest, and consequently to be made up separately; but still it is very well worth his care, the worst saffron bringing a large price in proportion to any other produce. Let him make the gatherers take up every flower, and see all picked with the same care as the others. When the kiln is ready, he is to spread his papers over the hair cloth, and then lay on this saffron, to the thickness of four inches. When the saffron is spread, the next thing in the fine kinds is to cover it with other papers and the blanket; but in this a little small beer must be sprinkled in among it, from the end of a clean brush. The small beer should be clear and stale, and a bowl of it standing by, the brush is to be dipped in, and when taken out and drained a little, the handle of it is to be struck against a stick, held in the left hand, by which means the beer that is left among the hair will be scattered in very small drops among the loose saffron.

The fire is now to be put in, and it should be rather less than is used for the fine saffron. The sprinkling with the brush is to be repeated from time to time, till there be a good deal of beer got in and perfectly mixed, and till the effect of the heat begins to raise a little steam from it. At this time the upper papers are to be laid on, and the blanket upon them, and soon after the board and weight. Then the whole is to remain about five and forty minutes, when the board, blanket, and papers, are to be taken off, and it is to be turned as the other kind. The quantity of beer must be enough to moisten the blades, without any running from them, and it will serve in the place of that natural moisture they should have: they will sweat and soften, and blend together, like the fine saffron, which they would not have done otherwise for want of due moisture. Many things have been tried, but none answers this purpose so well as small beer. Some use water, but that subjects the cakes to mould: others have used white wine, but that draws away the colour of the saffron, and gives it to the papers; others have used ale, but that is too clammy: it is a very nice article, and of all things that have been tried, or perhaps ever can, there does not seem any that will answer so well as the old plain country practice of small beer. This is a little strengthened beyond water, and it has a little clamminess, these are enough, it will not grow mouldy; it does not rob the saffron of its colour, and it gives a toughness which is sufficient.

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The cake is to be dried, in the same manner as that of the finer saffron; but it is best to keep the fire throughout a little more gentle, and to let it lie six or seven and twenty hours.

C H A P. LXXVIII.

*Of certain particularities in the preparing of saffron.*

SOME have attempted to alter the kiln for drying saffron, and introduce new and particular methods for curing of the cakes, but by all I have seen they are worse than the old way. The first improvement that was attempted, was to lay a network of fine iron wire across the top of the kiln, instead of the hair cloth. This was said to have great advantages, the principal was, that the saffron dried faster, and with a smaller quantity of fuel. This is true, but we have shewn in many articles before, that there are savings, which are the greatest losses. The fuel used in drying saffron, is too trifling to deserve naming; and as to the article of time, what is the bestowing a day and night upon a parcel of a commodity, the value of which is so great. The disadvantage that attends this method, is more than the good by many degrees, the saffron is not enough defended from the absolute force of the fire: it burns if there be not the most exact care taken, and often in spite of all the care that can be. The cake dries quicker, but that is a fault; for the great benefit of the caking, is the time it will keep moist and good in that condition, and that is the effect of the thorough soaking it gets in the slow drying.

A second improvement is, the using linnen cloths instead of the papers laid over and under the saffron; there does appear a possibility of making an advantage of this, for the linnen falls closer, and presses more perfectly upon the saffron than the paper can; but we are not got at the compleat management. The custom at present is to lay a parcel of papers upon the hair cloth, then to spread the linnen over them, and upon that to lay the saffron, which they cover with the other linnen, and then lay on the blanket; but there is an inconvenience in this, for the saffron dries too hastily at top, and frequently has the marks of the cloth on both sides, which hurt the smooth and rich appearance of it, and are not easily got off again.

This is not to be rejected, as the wire covering, but improved. The method I should propose is this. Let him have a few sheets of thin fine paper, such as in London is sold under the name of thin post, and some quires of the common cheap sort beside. I have found that for this common kind, what are called the outside quires of printed demy, are the fittest, they are large and smooth, and not too compact. These may  
be



be bought for about four-pence a quire, and if there be some imperfect sheets among them the matter is not much. I would have the husbandman set out with some quires of this, a few sheets of the thin post, and a couple of pieces of middling fine cloth; each so large as, when doubled, to be of the size of the hair cloth. Let him also have his blanket and other matters in readiness. Having stretched his hair cloth, let him lay upon it some sheets of the demy paper, on these let him lay one of his cloths doubled; and when he has spread and stroaked this smooth, let him lay evenly upon it as much of the fine paper as will just cover it, cutting it into pieces for that purpose, so as to make an even bed for the saffron. On this let him lay his three or four inch thickness of saffron, as it is of a finer or an inferior kind, and then cover the saffron with another even bed of single fine paper, and lay the second double linnen cloth over that. Upon this let him lay on other sheets of the demy paper, and then the blanket. This done let him proceed in the manner as already directed. He will thus have the advantage of the linnen, which is a real improvement without its inconveniencies, and will press his saffron into a fine cake, without the marks of the cloth.

A third variation in the management of saffron at the kiln, is the using a stuffed pillow instead of the blanket, for covering it. We name this under the title of a variation, because it by no means deserves the title of an improvement: for it has not one advantage over the other method, but is in every respect worse. The pillow is made of canvas, and filled with straw. We need say no more about a thing which we so utterly condemn.

## C H A P. LXXIX.

*Of the papers used in drying saffron.*

WE mention an article dependent upon the saffron trade, in which the owner has an advantage, but in which the abuses are so great, that, in point of honesty, he ought to be upon his guard, to discountenance such as practise them. Papers are, in the common way of drying, spread under, and over the saffron. Now the pressure which connects the blades of saffron into a firm cake, cannot fail to dislodge some of their juices: these are of a rich colour, and they stain the several papers, penetrating through them as they lie one over another. These papers, especially such as have lain next the cake, are strongly impregnated not only with the colour, but the cordial virtues of the saffron, their taste manifests this; and they  
very



very readily communicate their colour and qualities to liquors poured on them.

The distillers make several cordial waters, usquebaugh of the yellow kind, and the like, which the receipts order to be coloured with saffron, or more properly speaking, they order saffron to be put into them for its cordial virtues: the distillers finding there were papers thus strongly tinged with saffron, in the common way of curing that commodity, bought them up and coloured their liquors, saving the price of so dear an article as saffron. Had the abuse stopped here the matter had not been very great, but the next step was, that the apothecaries, or rather those retailers in London, who call themselves chymists, and very unhappily for the buyer, rob the apothecary of that part of his business, took these papers into their hands. These persons are ordered by their dispensatories, to make a syrup of saffron, by infusing a large quantity of saffron in strong white wine, and then melting the finest sugar in it; but they pour a pint of boiling water upon a couple of sheets of this paper, and sweetning the strained liquor with two pound of middling sugar; they sell this as syrup of saffron. They are ordered to make a tincture of saffron also, of the finest saffron infused in wine, or any stronger liquor; but for this purpose these people only dip some saffron papers in wine, or spirit, till the liquor is yellow enough, and this they sell for tincture of saffron.

They use these papers also on many other occasions, defrauding the sick of that help the judgment of his physician would have given. The saffron trade is hurt by this; and that it would be their interest who raise it to join in a resolution, that no saffron paper should ever be sold again. This can only be done by a joint resolution to destroy all of them; and I am convinced that if they would have the spirit, they would find the price of saffron rise in one year, so as to make them ample amends for what they would lose in the sale of the papers: the demand must be greater, and the trade would every way feel the benefit of it.

If this cannot be brought about, let me advise the owner, to avoid those wicked artifices which are used by too many, to give more colour to the fainter papers. This is done with other ingredients, not with saffron. I shall not name them, lest I give instructions for a practice against which I write: but certainly so much of this artifice is used at present, that the quantity of what are called saffron papers, used annually in London, is six times as much as all that are fairly produced in a year. This I mention as a farther caution to the saffron owners, for  
it



it is striking at the very root of the trade. They are sensible that the demand is not what it used to be, and they may be assured this is the reason.

## C H A P. LXXX.

*Of the produce of a field of saffron.*

**T**HE first year affords the husbandman but a moderate advantage in this article: nay, sometimes the crop is scarce worth the charge of gathering, picking, and curing; but a field of saffron is planted for a three years continuance, and it is from the second and third of these seasons he is to expect that great advantage we have told him there is in raising this commodity. Nothing is more uncertain than the quantity that shall be produced the first year; sometimes from a rood of the land there shall not be gathered above a pound or two of fresh blades, and sometimes less: so that it will not pay charges; but from this to about seven pounds from the rood, is the most general produce: and at an average, where every thing has been rightly managed, and the season moderate, the owner may expect about five pounds. This will yield about one pound of saffron when prepared, and ready for sale.

This produce of the marketable saffron from the fresh blades, is to be reduced to great exactness. If proper care be used, the owner may expect one pound of saleable saffron from every five of the first gatherings, and about a sixth part less from the pickings of the last flowers; those who use ale have found, that less than five pounds of the poor blades will yield a pound, but this is owing to a part of the clammy moisture of the ale being left in the cake, and the price is reduced more than the increase of quantity compensates. On the other hand, six pounds of the same fresh blades go to make a pound of pure saffron, in the way we have directed; and this is a proof the small beer dries away, only serving to moisten and sweat the saffron, and leaving little behind in the cake. The time that a three acre field of saffron will continue flowering, is about four weeks. Three weeks of this yield the fine rich saffron, and the last week only yields the poorer blades, which require that artificial management we have named. The great profit arises from the two last crops: but the owner is not to understand, that the produce of those two is equal. The second yields a vast quantity in proportion of the first; and the third is the richest of all. The produce of saffron, taking in all the methods of advantage we have named, may be very moderately set down at four and twenty pounds of marketable saffron to the acre for the two last years, reckoned together. The first bears no proportion to these, but this is a vast profit.



## C H A P. LXXXI.

*Of the management of the saffron field the two succeeding years.*

THE owner, who has gathered his first crop, has very little trouble or expence to come. The roots retain their full vigour, and the ground having been so thoroughly prepared, will supply them with nourishment without farther assistance; all he is to do is to destroy weeds, and to preserve the roots from injuries. He must have the land hoed, and he must regard the season for the first shooting of the roots for flowering. As to the latter article, he has no care upon his hands but to keep his fences good, that cattle, and particularly hares, be kept out, for they are very apt to infest the saffron fields in winter.

As to the gathering, picking, and preparing the saffron, it must be the same as at first, only as his crop will be much larger, he must employ a greater number of labourers; and as he has more at stake, he should not grudge to be more careful, in the over-looking every part of the work. The saffronmen in some places turn in their cattle after the leaves are fallen, to feed upon the weeds that grow among them. But that practice runs counter to reason. Nothing is of more benefit to saffron than hoeing; this is to be performed at a moderate expence, and if repeated at proper times there will be none of this growth of weeds: and in the next place, if this have been omitted, and there be a growth that may serve the cattle a little, their feet will disturb the roots, and harden the soil. Nothing can be more beneficial to any crop than breaking the ground while it is growing. The suffering it to be trod down by cattle has a contrary effect.

The longer a crop is in the ground, the more it will stand in need of this operation; and the richer that crop is, the more it will deserve it: now saffron is to stand three years, and is one of the richest crops a ground can bear; for these reasons hoeing ought to be frequently repeated. The more compact the ground is, the less benefit it receives from the sun, air, and rains. Therefore let the husbandman frequently hoe his saffron fields, he will give a much larger share of nourishment, and by destroying the weeds, he will make it all go to enrich the saffron. The more he hoes the ground the heavier the chives will be, that is, the more saffron he will have. The charge of hoeing frequently will cost something extraordinary, but he may be assured, he will gain two hundred per cent. upon all the money he shall expend in this manner: as there are few articles so profitable as saffron, there is scarce any in which there is room for more improvement.



## C H A P. LXXXII.

*Of breaking up a saffron ground.*

**S**AFFRON is to stand three years. The plantation has then done its utmost, and he is to break up the ground. The profits would naturally make him unwilling to give up such an article, but he is far from being under a necessity of doing it, he must take up his present plantation; but he is in a better way than ever to begin another. He is now in the condition of the person from whom he bought his roots, and as he will be able to supply others with such as are to spare, he will know how to keep the best for himself. Whatever may have been his profits in his first three years, he may promise himself much greater in the following: because he now sets out with more knowledge, and will be at all the needful expence and care with more freedom and spirit. As he will therefore not fail to chuse his ground properly, and dress it well, and will set out with such a choice collection of roots as he never could have got by purchase, he may promise himself not only a much larger, but a much more certain and continual gain. He is now to set about the taking up and transplanting his roots, and either using all to enlarge his stock, or selecting what quantity of the best he pleases, and disposing of the others as he at first bought them, to a certain advantage. If he chuse to enlarge his plantations, let him first separate his roots, the finer from the inferior, as if it were for sale; and let him throw away the very worst. When he has made this division, let him plant his large and fine roots in one field, and his smaller and inferior for a new growth in another.

Let the farmer who is about to enlarge under this article, consider his other circumstances; let him see whether he must not neglect something essential, to fall so largely into this particular; and finally, let him consider the number of hands that are wanted, and where he shall find them. We do not mean to dishearten him from enlarging his saffron grounds; but would have him set about it with discretion. The great profit may tempt him to exceed the bounds of caution, and for that reason we lay these hints before him, that if he find he cannot consistently with his other necessary affairs, manage a larger crop than his former, he may content himself with the same quantity of ground, for that will now yield him a larger produce and require a larger number of hands in proportion: if he find he can have opportunities, and hands for a larger quantity, that he may proportion his undertaking, to the nature and convenience of his other affairs. Nothing would perplex him



him more than to have a larger plantation than he found at the season he could manage. And nothing would be subject to greater loss; for the gathering and curing of saffron is a thing that cannot be delayed when it is ripe.

The last gathering being over, and the saffron cured for sale, let the field be carefully plowed up. The farmer must send in a careful and honest fellow for this service, as well as a good plowman. He must be told, the depth at which the roots lie, and he must take care to cut beneath them that he do not injure them, and that he turn them all up. Twelve or more people are to be sent in to follow the plow, and to pick up the roots: each is to have his basket, to toss the roots into as he gathers them from the ground; first giving them a gentle stroke against the outside of the basket, to strike off what mould may happen to stick in lumps about them. When the plow has been through the ground, and the roots collected after it are brought in, the whole is to be harrowed twice over with a good well tined harrow. This will penetrate four or five inches into such light land, and consequently it will bring up all those which the plow turned under the mould. The same people are to follow as they followed the plow, picking up every root they see. I have generally observed, that by that time the field has been twice harrowed, there is hardly a root left in it. These roots are to be carried to the rest, and all thrown together on a large floor, where people are to be set to pick and clean them. What is to be done is only to clean the roots from earth, from dead parts, and from old skins, or other foulness. This is the proper time also to separate the fine from the others. The cleaners should be told to throw them into two separate parcels; the large into one heap, and the smaller and leaner into another. When the roots are cleaned, they will keep good some time; but the best method is to plant them out immediately.

The husbandman knowing the time when his roots are to be taken up, he should have a fresh piece of land well chosen, and thoroughly prepared. While his roots are picking, he should give this the last plowing, and immediately after send in the spitters and setters; giving to the last his choicest and finest roots. This foundation laid for his great crop, let him with the same care plant the lesser roots in his second field. As there are certain variations in the manner of drying the saffron, so there are in the article of breaking up the ground. Some instead of plowing use a particular instrument called a pattock: this is a kind of forked hoe, or prong hoe, with sharp and strong points; but I altogether give the preference to plowing.



This instrument is very apt to wound the roots ; it is manual labour, and therefore comes more expensive ; and it does not so perfectly clear the ground.

## C H A P. LXXXIII.

*Of saff-flower, or carthamus.*

**T**HIS is a plant less known than any other which comes under the cognizance of the farmer, nor is there any great matter to be said in its recommendation : however, as it is cultivated in some few places in England, and very much in other parts of Europe ; and as there may be circumstances that may render it advantageous to the farmer, we shall give him an account of its nature and management.

Saff-flower, or carthamus, is cultivated for the flower, and probably the culture of saffron gave rise to this article, for its flower is used to some of the same purposes, and it is called for that reason bastard saffron. The plant is a kind of thistle, and has very much the appearance of a weed. It is an annual. The stalk is robust, and four foot high. The leaves are large, not divided or indented, but beset with prickles at the edges : the flowers grow at the tops of the branches, and are a kind of large scaly heads, resembling those of our thistles, with a great quantity of threads issuing out at their tops. These threads are of a bright and beautiful yellow, and have been supposed by some to resemble the blades in the flower of saffron ; but there is not much likeness : it is for the sake of these the plant is cultivated principally, though the seeds are also an article in trade. The flowers are contained in a large common cup : it is of an oval form, and composed of scales placed like tiles one over another, and they have each the addition of a little leaf of an oval form. The whole tuft is composed of tubular flowers, each is formed of a single leaf, and has the hollow narrowest at the base, and wider all the way to the mouth, where it is divided into five little segments.

In this flower rise five short filaments, and at the tops of them stand so many buttons, which are of a cylindrick form and oblong. In the base of the flower is deposited the rudiment of the seed : this is very small and short : from its top there rises a kind of filament longer than the others. This is the part to which the three blades grow in the flower of the right saffron ; but in this it is terminated only by a plain little head, which serves to receive the dust from the buttons of the short filaments. When the whole flower is faded, the scaly head remains, and contains the seeds.

Several species have been added to this, one with blue flowers, and



and others with divided leaves ; but the true and proper plant to be raised for use, is that here described. It is a native of Egypt, and is cultivated in the warmer parts of Europe. The principal place where we have seen it in England, is in Norfolk ; but, if worth while, it may be raised in any other part of the kingdom.

Let the farmer have the seeds from abroad ; and as often as he sows it let him get fresh, for they do not ripen well in England. These may be had at a small expence. The druggists sell them, but theirs are commonly old. Such a quantity of it is raised every year in Germany, that good seed may always be had. The best soil is a dry loam, and it does not require a rich piece of land of this kind ; so that the charge of this article is not great, nor indeed in any other. The seeds are to be sown by hand in a sparing manner, in spring, and harrowed in. When the plants have some strength, they are to be thinned. Hoers should be sent into the field, and should not only cut up weeds, but thin the plants ; leaving them at about a foot distance, and saving such as appear the strongest. From this time no farther care need be taken, they will grow quick, and being strong, and thus near to one another, no weeds will get nourishment among them. Early in autumn they will begin to flower. The plants branch out toward the top, and the upper part of every branch is loaded with flowers, so that the whole field is covered.

The gathering these flowers so far resembles that of saffron, that they are to be taken as they open ; for if left several days together, they will lose their colour, and that is their whole value. As soon as there is any number of them open, the pickers are to be sent into the field. The whole business is done at once. The whole tender part of the flower is to be taken, leaving the scaly bud. When those which are open are picked off, they are to be spread upon a large floor in an airy place, out of the sun to dry ; and this is all that is to be done to them. When they are dried they look of as beautiful a colour as while growing, and are ready for sale. Every day the pickers are to be sent into the field as at first, to gather the flowers as they shew themselves, and this is to be the method till all are blown ; one parcel being put to dry after another.

If the season have been favourable, and the crop have flowered early, some seeds may ripen ; but as this is a great uncertainty, there is no dependance upon it. The better method is to grub up the plants as soon as the flowers are gathered, that the land may be prepared for some other crop. The dyers purchase the flowers ; some have idly supposed they were of the same nature with saffron ; but it is so far otherwise,



that as saffron is a cordial and sweat, these flowers are a purge; and the seeds a vomit.

We have mentioned the only right and honest use of the flowers: but there have been some, when it was more cultivated in England, who had a way of mixing it with saffron when they worked it in the drying. How improper this was we may know from the difference of the virtues; but there was another reason why the farmer never should have done this, for it reduces the price. The thready part of the carthamus is narrow, harsh, dry, and is paler coloured than the blades of saffron; therefore no art can so blend them together, as to make them capable of imposing upon any but the ignorant: 'twas the inferior sort of saffron made up from the last gatherings that they mixed up in this manner, and it reduced the price of this still lower. One reason why the foreign saffron is held in so much contempt in England is, that there is too often carthamus among it.

#### C H A P. LXXXIV.

##### *Of Madder.*

**MADDER** is cultivated principally for the dyers; though there is also a consumption among the druggists. We shall very strongly recommend this to the farmer; for the sale and the profit are equally certain. A vast quantity of madder is annually brought into England; it is brought from places that have no advantage over our own fields; and frequent experience shews, the plant will grow and thrive as freely and as well with us.

Madder is a plant of very little beauty, it resembles cleavers, in its manner of growth, but is larger and dusky coloured. The stalks are square, and of a reddish colour; weak, so that they lie upon the ground in their lower part; and in the upper, commonly intangle one with another. The leaves are long and narrow, they stand six at a joint; and are disposed like the rays of a star. Their natural colour is a dusky green, but they sometimes toward the lower part grow reddish. The stalk is hairy, but these are more so; so that they prick the hands. The flowers grow at the tops of the stalks, and small bunches; they are little, but very numerous, and of a pale yellow. The seeds follow, which are contained in a kind of round little heads; the root is extremely long, and of a beautiful red colour. The cup in which the flower is placed is very small, and stands upon the rudiment of that little roundish fruit in which the seed is to be lodged: it is composed of a single green leaf, divided into four little segments. The flower is formed of a single leaf, and is a little hollowed





*Female Hemp*



*Male or Steel Hemp*



*Garden Flax*



*Hops*



*Common Liquorice*



*The Coleseed Plant*



*Common Woad or Deersweed*



*Woad*



*Madder*



*Bastard Saffron*



*The Saffron Plant*



*Carraway*



*Anise*



*Garden Teasel*

*Compleat Body of Husbandry*







hollowed at the bottom, and divided lightly into four parts. In the centre rise four short filaments, each terminated by a single button: from the rudiment of the fruit, which, as it enlarges a little, shews itself to be composed of two parts, there rises a single style; this is divided into two parts toward the top, each of which has a head to it: this through imperceptible apertures, admits the dust from the buttons of the other filaments for the ripening of the seed vessel, which then swells, and becomes a kind of double berry: in each part of which, or in each berry, is contained a single seed.

Two kinds of madder are mentioned by those who treat of plants: the six leaved kind, and one which has only four at a joint, but the latter is not worth the farmer's notice. In places where the right kind is cultivated, there grow up a number of plants in waste places from the scattered pieces of roots, and perhaps from seeds: these being smaller than such as have culture, are distinguished as a separate kind under the name of wild madder; but they are the same plant. Madder is a native of the east, and of some parts of Europe: but its roots in the wild state never arrive at perfection for this plain reason; that in the latter condition they run in a free, light, wrought ground, where nothing stops their progress; and though they never attain any considerable thickness they grow to a vast length.

## C H A P. LXXXV.

*Of the proper soil for madder.*

THE soil for madder should be deep and light. It will get nourishment whether the ground be richer or poorer, provided it be not altogether barren. A black mould, such as is common in the fens, is very proper; and is the same soil whereon they plant it in Flanders: A loamy soil that has but little clay in its composition, is also very proper; or a mixture of loam and mould, as is common in many parts about the edges of the fen countries. This plant would thrive excellently in these places; for they have all the advantage of the Flemish grounds; and they are drier. The Flemish often burst their roots by their over moisture, or occasion an expensive manner of dressing to prevent that accident. It is the nature of the root to extend itself in length, and no art can bring it to any great thickness; therefore a depth of soil is the most essential point. There are produced a great many side roots, which spread along under the surface of the ground: these are the provision of nature, for the nourishment of the stalk and leaves, the principal root taking almost all the juices it receives to its own nourishment. As the stalks and leaves of this plant are of



no use or value, it is idle to provide for the maintaining them in vigour at the expence of the main root. These horizontal shoots never come to any value, and as they only take that nourishment which should supply the main root, the proper course is to destroy them.

This account of madder, and of the soil that suits it, points out a new method of managing the crop to advantage. Of all plants none is so perfectly suited to the horsehoeing husbandry. The soil is such as suits those implements; the method of horsehoeing will most effectually cut off the shallow and horizontal roots; and as the main roots are to be encouraged in their growth to the utmost, no method of planting can be so proper as that in rows at a considerable distance from one another. The culture of this profitable species, has been recommended frequently and strongly, and has been tried at different times with various success, but always with some profit: we hope therefore the farmer will be encouraged, from what has been found of the advantages of this crop, in methods less suited to its nature, to try it in the way we propose; in which it cannot fail of very well answering his care, expence, and trouble; and there is a reasonable prospect of his enriching himself by it in a few years.

#### C H A P. LXXXVI.

*Of the management of the ground for madder.*

**M**ADDER is to be planted in the spring, but the preparation of the ground must be undertaken long before. Let the farmer look carefully for a field that has a deep light soil, of the nature of those kinds we have mentioned. In autumn, as soon as the crop is off, let him plow it up deeply and thoroughly with a four coultered plow. Let him leave it in this condition three months, and then go over it with the same plow once again: this will tear it up to a great depth, and thoroughly break and divide it: let him then leave it to itself till the end of March: at this time let him look out for sets in some of the garden grounds about London, where a quantity of madder is raised for the supply of Covent Garden market, and to dry for the druggists. In the last week in March, let him send in his four coultered plow again, set to go to the greatest depth it can. As the ground has been twice plowed before, it will readily give way to this, and the third plowing being well and carefully managed, the whole field will be turned up more than two spit deep, and nearly as well wrought as by hand with spades, though at a much smaller expence. The sets are now to be taken off from the sides and heads of the old roots,  
and



and the ground is to be harrowed even. Then a line is to be drawn along near the edge, as in the planting of liquorice; and the sets are to be let into the ground in the same manner, at a foot distance from one another.

When one row is done, the line is to be removed a foot and half, and another row planted, the sets in this not being placed opposite to those in the other, but just over against the middle of the spaces between. The line is then to be removed to the distance of five foot, and drawn straight over the ground as before, and a row of the sets are to be planted there; thus there will be a third row at five foot distance from the second, and at six and a half from the first: the line is then to be moved again one foot and half, and another, being a fourth row, is to be planted opposite the middle distances of the last.

In this manner the whole ground is to be planted out. The sets are to stand every where at the same distance in the row, as at first ordered; and the whole field will be laid out in double rows, with five foot intervals; the space or partition between one row and another, of each double row, being one foot and a half. When the sets are all in and lightly covered up, let the planter go over the places where they stand, with a garden rake, and lay the surface level. The beginning of April is a season when showers are seldom wanting, but if it should so happen that there are none, there must be the labour of once watering the sets. The best time for doing it is on the third day after their planting, and when this is done they may be left to nature.

#### C H A P. LXXXVII.

##### *Of managing the crop the first season.*

**T**HE plants will quickly appear, and weeds among them. As these must be principally seedlings, they will not at once over-run the proper growth, because that is planted with good roots; so that they need not be attacked so soon as ever they appear; but when they have got a little height, the hand hoers must be sent in to clear the partitions between row and row, not meddling with those in the five foot intervals, except just on the outside of each row. This must be done with care. The instructions to be given the hoers are these. First to take care of the plants of madder, which being set regularly, and now up at some height, cannot well be mistaken: the destruction but of a few of the plants where they are set sepearate, and each intended for a large growth, will be a considerable loss. This being pointed out to them, they are to cut up all weeds in the partitions, and break the surface of the ground as deep



as they can with those instruments; then they are to clear away between plant and plant of the madder; and thence advancing to the outside they are to cut up the weeds, and break the ground for about a hoe's breadth all along the rows.

This done the plants are to be left three weeks, in which time they will strike very strongly. The middle of the large intervals will then be full of weeds of some growth. The horsehoe is to be sent in, and it is to cut along the middle of each interval, as deep as it can go. This will thoroughly destroy that growth of weeds, and break the ground. The weeds will be buried, and become a kind of manure; and the ends of some of the longest fibres of the madder roots will be broken off, and new ones will consequently grow in great quantities from them; there will be a fine quantity of fresh earth for these new roots, as also for what farther shoots the others may make; and it will be full of nourishment. The main downright roots are all that are of value. The horizontal or spreading ones, that run under the surface, are to be considered in two lights, as they are larger or as they are smaller, for at one of these times they impoverish, but at the other they feed the main roots: so that at one time they are to be nourished, and at another destroyed. While they are young they are of advantage to the main root. This is their condition in the present instance, and it is therefore we are recommending every method to feed and encrease them; and on the other hand, we shall soon after take pains to destroy them. The part of the madder above ground, is not so large as to demand any vast quantity of nourishment; the root is pushing downward, and grows the faster the more it is supplied by its fibres, and the less it is drained by the plant above.

This is the case at the period of growth whereat the madder is at present. The first nourishment the new planted roots take in, goes to the pushing some fibres from themselves outward, and a shoot of stalk and leaf upward. This shoot takes up the greater part of the nourishment in the first days, but afterwards it grows slower, and requires a smaller proportion of what is drawn. After this there is a period when the main root is taken care of and supplied, that it may be able to send up nourishment in abundance to the herb, when ripening its flowers and seeds. For this purpose in madder the long horizontal roots grow out every way under the surface. These fibres for which we are now so carefully providing by the horsehoe, are in time to become those long horizontal or side roots. At present they are serviceable, for they draw nourishment in vast abundance; which being not demanded in that quantity by the plant



plant in its present state, goes according to the design of nature, to the feeding and enlarging the main roots. The present horsehoeing has vastly encouraged, filled, and encreased them; but the next is to destroy them.

Some time after this there will be weeds again in the partitions, and between plant and plant, the hand hoers must be sent in again to cut them up, and the plants of the madder being kept clear, will have a healthy aspect, which is very essential to the good growth of the root. Some weeks after this, when the madder has grown to a considerable size, let the horse hoe be sent in the second time, with orders to cut much nearer one side, or one row, alternately: by this means all the large horizontal roots on that side will be cut and broke off, and only small ones will grow from the ends of them, which will tend to the service of the main root again. The hand hoers at this last time need not hoe the outsides of all the rows, but only alternately of those near which the horse hoe is not this time to come; for the next hoeing it is to take the others. This instrument could not be brought so near the rows while they were young, for fear of tearing up or burying the plants, but they are too well established now to be in any danger, especially as it is done only on one side; for the horsehoe is to be carried along the farthest side of the next interval all the way, so that it never comes near both sides of the same row. The plants will thrive surprisngly, and advance toward their flowering. There will need no more handhoeing, for they will be now of such a strength, as to destroy the weeds about them; and the next horsehoeing will compleat the work for the first season.

This is to be done when the weeds have got some head again in the intervals. The instrument is now to be carried on the other sides of the rows alternately, so that there will have been a thorough and deep cutting up of the ground, near both sides of every double row. The large horizontal roots, which would impoverish the main root, are now broke and cut off on this side also; and the main roots, which are large and strong, have all the advantage of nourishment. The flower and seed of madder are useless: and we have seen, how greatly a plant's running to seed impoverishes the root. This dictates a new practice in the present case, which is the cutting down the plants just before they are breaking into flower. The farmer is not to cut them down close to the ground; it is enough if he stop their running to seed: therefore all he has to do is to cut them off half a foot below the top. This will take off all the flower buds, and yet will leave enough of the plant to draw up a quantity of sap, and keep nature in her proper course. By this means



means a vast quantity of rich juice, intended for the perfection of the plant in its ripeness, will go to the main root, and the encrease in that useful part will be surprising. The stalks will shoot out side branches and grow strong and bushy. Some of these will flower. But the few flowers that grow upon these shoots are not like the full flowering of the whole growth, they will do no harm, and are not worth regarding.

The first summer will thus pass, and the plants not having drawn a vast deal of nourishment upwards, the roots will be greatly strengthened and encreased. All that is to be done afterwards is in the same manner to promote the growth of the root, during the rest of the time it is to remain in the ground, which is the next autumn. A crop of madder, though it remain but eighteen months in the ground, is to be accounted by the farmer as a two years standard, because the preparation of the land takes up the other six months. In the usual way when the roots are taken up for sale, another piece of land is to be sought out for the next crop; but in the method we have proposed, the same piece of ground may raise madder for ever; and will be fitter for it than any other could.

#### C H A P. LXXXVIII.

*Of managing a crop of madder the second season.*

**A**LL the winter succeeding the first summers growth, the ground is to lie quiet: in spring, a fortnight before the plants begin to shoot, a horse hoe should be sent in to cut a deep furrow in the center of every large interval, and the hand hoers to destroy those weeds that rise in the partitions. After this there will be no more care needful about them, but the intervals will have weeds, and should be horsehoed just as in the preceding summer. This is to be done in the same manner as the first season.

Autumn, when the plants wither, is the time to take up the roots, this must be done with care, for the more they are broke in the ground the more of them is lost. The regular method of planting them is of great use, for the people employed to take them up know where to look for them one by one, and where they may, and where they may not, work about them. When they are all taken up they must be cleaned from dirt, and after a quantity of fine sets are seperated for a new plantation, the rest are to be dried for sale. The dyer will be a ready purchaser, nor needs the husbandman fear to overstock the market. The use of the root is to die reds and purples, and as an ingredient in many other colours: and the quantity imported annually from Flanders, Germany, and Holland, amounts to fifteen, twenty, or twenty five thousand pounds.

C H A P.



CHAP. LXXXIX.

*Of planting a second crop of madder.*

THE husbandman may reasonably promise himself much larger advantages from the second crop, because he will have, 1. Experience and knowledge in its management. 2. A better supply of sets; and, 3. A fourth part more time for their growth. In the setting out six months were necessary for preparing the ground; but the land is now ready; the five foot intervals have been long in a state of fallow; and they are ready to receive the new plantation. In the beginning of October the ground is clear, and the sets are taken from the old roots. While these are preparing for the ground, let the ground be got ready for them.

The method of planting is to be the same as at first, in double rows, with a foot and half partition between the two, and with a five foot interval between pair and pair of them. The rows are now to be planted in the middle of the former intervals; and the places where they stood before, will become the middles of so many new intervals; and these enjoying a fallow of two years, with frequent tillage during the whole time, while the new plantation is growing, they will after that be in a condition of a new crop, and so on from season to season; the same field by this management being enabled to bear the same produce for ever. While the pickers are selecting the finest and strongest sets, let the four coultered plow be again sent into the ground. It is to tear up the middle of each interval, and is to be followed by the harrow. By that time the ground is thus wrought, the sets will be ready, and the sooner they are let in the better. These will be such in strength and goodness, as it would be impossible to obtain by purchase, and they will strike immediately. The lines are to be drawn as for the first plantation, and the sets let in with the same care. They will have time to strengthen themselves for the following winter, and will be so rooted and fixed in the ground by the succeeding spring, that they will shoot in a manner not to be expected from a spring plantation. The ground will be now much better than at first, because it has been continually turned and new broke during the growth of the other crop: and as the weeds were always destroyed in their first growth, the whole soil is full of nourishment.

The madder being planted, is to be managed as the first crop: it is to be taken up two years after planting, and it will be found vastly preferable to the other. Some who have raised madder, propose keeping it three years in the ground; but they certainly had not fairly tried the difference. The roots will gain some-  
thing



thing the third year, but not comparable to the disadvantage of the loss of a whole year's time; neither are they always good.

## C H A P. XC.

*Of the preparing madder root for sale.*

**T**HERE are different ways of managing the root when taken up; and different forms in which it is brought to market: But we advise the farmer to think of nothing more than plainly drying it, and selling it entire: at least at first. It may be very well dried in a hop kiln, with a little fire; and it will always sell in that state. The other methods of managing it are by stripping off the outer rind, then the second bark, and so selling it in the three forms, of the rind, the flesh, and the fibre: it may be in either of these states ground, and sold in the condition of powder. For all these purposes labourers may easily be had from the countries where the raising of madder is common; and they will soon let the owner into the manual operation. Let him first raise his madder as we have shewn, and sell it plainly dried; and after that, let him get proper people to superintend and manage the several operations in preparing the root for more advantageous sale; always having an eye over the work himself, and making it his chief care to get into the secret of the several practices. If he omits this, he will lie at the mercy of his servants, which is a miserable as well as hazardous situation.

We shall here add, the terms by which madder is called in its several states, according to these ways of preparation; and the method at large in which they are manufactured. There is more in it than can well be conveyed in words, for these manual operations are to be learned like trades, by practice, not from description; but enough may be said to explain the several kinds and forms. When the root is only taken out of the ground cleaned from the earth that hangs about it, and dried, and in that state offered to sale, it is called madder in the branch. A great deal is brought from Flanders in this condition, and our people are very willing to purchase it: but as this is the least profitable management, this branch madder is brought principally from those places where the trade is least understood, or where they want hands or engines for the managing it according to the other ways.

The first management after this affords three species. In order to the preparing these, the root must first be dried to a certain degree: then its several parts separating easily, they strip off first the outer skin or rind, and next the fleshy part, leaving the pith or central matter bare and entire. These they  
lay



lay in three heaps, and distinguish by three names. The first, which is only the outer rind, is coarser and fouler than the rest, this they call mull madder; the second is firm and beautiful: from its running into quills when it comes off entire, which have a round opening at the ends, they call this Letter o madder, and sometimes Number o madder, or plainly O madder; the third parcel, which is the entire pith of the root, and is of a paler colour than the rest, they call Crop madder.

These with the plain root are four kinds of madder for sale, and these are in reality all the differences, except the reducing it to powder; but as different kinds according to these distinctions may be, and are reduced to this condition, they are called by various names. The ground madder is principally of two kinds; it is either the whole root dried, which they call branch madder ground to powder; or it is the middle part, called number o madder. When the entire root is ground, it is usually sold under the name of bunch madder; and when the number o madder is ground, its name is loose madder. These are the terms; which the cultivator of madder will now easily understand. It is not essential to him to follow these several practices, but he will find it profitable. He may always find a ready market for the entire root dried, which is what the purchaser knows under the name of madder in the branch; and without concerning himself farther, may thus make such a profit as will surprize the unacquainted with these things to hear it named.

## C H A P. XCI.

*Of teasil.*

**T**HIS is an herb raised for the woollen manufacture: and for this reason while the woollen manufacture continues so important as it is to England, it will be worth the farmer's while to be acquainted with it; and, according to the nature of his situation, and the demand, to cultivate it. Teasil may be raised in any place; but it is of cumbersome carriage: therefore he must be very imprudent, who sets about to cultivate it at a distance from the places where it is used, because nothing need prevent those from doing it who are upon the spot; but to such as are, it proves on many occasions a profitable growth. It does not require the best of the farmer's ground; and it demands very little trouble; for after it is once up, it is too strong for weeds.

For these reasons, he will find it may be often his interest to raise it in the cloathing countries. Teasil is one of those plants which shew most obviously the effects of culture. We see things raised to a perfection in gardens, which they never attain in their wild



wild state : but we have seldom the opportunities of comparing one with the other. In the teasil they are always before us. What we call wild teasil in the hedges, is the same with that the farmer is to raise for the use of the clothier, excepting the difference from culture, and they may always be viewed together to see what that is. The heads of the cultivated teasil are raised to a perfection those of the wild kind never reach, and on that change depends entirely their use in the manufacture.

The common teasil is known by its tall stalk, and great rough heads ; we shall therefore confine our description to that plant as improved by culture. The manured teasil grows to the height of ten foot, and is a robust, stately, and very regular plant. The root is long, thick, and white. The stalk is firm, and of a pale colour, and armed with prickles. The leaves from the root are very large, long, and of a bright green, and are full of sharp strong prickles. Those on the stalk are of the same shape : they grow in pairs, and joining one another at the bottom, they surround it, forming a kind of basin about it, which holds at all times a great deal of water caught from the dews and rains. These leaves, like the lower ones, are full of sharp prickles. Toward the top of the stalk rise several branches, and these divide again into others near their extremities ; and at the top of every division there grows a large rough head, as big as a man's fist, and of a somewhat oblong form. This resembles the head of the common wild teasil, but is bigger ; and as it is covered in both kinds with a kind of small tough prickles, these which stand nearly straight in the wild, all bend downward in form of hooks, in the manured teasil. By that circumstance it is the head is so fit for the service of the clothier : it becomes a kind of natural instrument for the dressing of cloth, which for the number, disposition, toughness, and springyness of its hooks, exceeds any thing that can be made by art.

These heads contain the flowers, and seeds of the plant. Each of the flowers has its particular cup, but that is very small, and stands upon the rudiment of the seed. The flower is small and hollow, it is a kind of tube, consisting of a single leaf, divided into four segments at the edge, the upper one a little larger than the others. In the centre rise four filaments : they are very slender, and are longer than the flower, so that they hang out ; and each of these has an incumbent little head, or button, containing the dust which is to impregnate the seed. From the top of the rudiment of the seed, and in the centre of these filaments rises the style of the flower : at the top of which also is a button pierced for the reception of that dust, and the conveying



veying of it to the ripening seeds : one of which follows every flower, and is of a longish shape.

C H A P. XCII.

*Of the proper soil for teasil, and its culture.*

**T**O know in what soil teasil will best succeed, the method is to see where it grows wild. It will live in this state almost on any ground, but it never is seen to thrive so well as when it chances to stand on a clay, among which there are some stones. If the farmer who resides in the neighbourhood of a cloth country, have a piece of stony, clayey ground, which is fit for little else, and is scarce worth the charge of manure, let him sow it with teasil : he will be at no other expence than a couple of good plowings, and he will have a crop that will bring him a much larger profit than he could make any other way from such a piece of land, without a great deal of dressing and expence.

There is not any plant whose culture is less understood, tho' nothing is so easy. Most advise sowing it in spring, and consequently a great deal of trouble in weeding ; and some allow it two years growth upon the land. The course of nature in the growth of the wild plant is this. The heads ripen in July, the seeds fall out, and take root in the ground ; they shoot up large leaves which stand through the winter, and in spring the stalk rises in the midst of them ; which toward the end of summer flowers, and is in its perfection. If teasil be sown in spring, weeds will rise with it, and must be hoed up, because they grow quick at that time ; but in autumn they are not so numerous, nor of so quick growth, and therefore the plant will get the better of them. This is more the case, because of the natural soil of the teasil, which being clayey, is one wherein few weeds grow, and those not vigorously. On this depends the proper culture, which we shall therefore direct the farmer to observe in the following manner.

A clayey and stony soil is best ; but an absolute clay will do. Let him begin the preparation of it in autumn, as early as he can : because the quicker the seed is got in, the more strength it will have in the shoot before winter. As soon as the ground is clear, let it be plowed deeply with the four coultered plow : after this let it be torn to pieces with the great harrow ; and when it has lain a few days, let it be plowed deeply again ; this last plowing is to be followed by another harrowing, and then it is ready for sowing. While the land is in this preparation, let the farmer seek out for seed, and let him take especial care that it be sound and new. The quantity to be allowed is,  
a peck



a peck to an acre ; and it is to be sown by hand, and harrowed in. The ground may then be left entirely to itself till the plants are up, and then there will require only one hoeing with the hand hoe for the whole business.

When they are of such a size that the strongest may be distinguished from the poorest, let the hoers be sent in. They must destroy the few weeds there are, and thin the plants, cutting up the weakest and leaving the most promising, at about a foot and a half distance. This hoeing will dispose the ground to receive the dews and rains ; and the remaining warmth of the weather and following showers, will invigorate the roots, so that the leaves will grow larger till they meet, and cover the whole field : after this no weeds can rise ; they will keep the ground moist, and by that means nourish the roots : in spring the stalks will rise, one in the center of each cluster of leaves, they will grow of themselves in their natural manner, and toward the end of July will be full of heads. This is the time of gathering them, and it is to be done by cutting and tying them up in middling bundles. These bundles are what they call staves of teasil, and they require nothing more than to be dried, in order for use. If the weather be fair, the farmer needs take no more care than to set up the bundles in the field : if there be rain he must house them, and dry them with a little more trouble. The common produce is about a hundred and fifty, or two hundred bundles to an acre ; and at the poorest rate they are a profitable crop for such land.

The greatest part of the teasil raised in England, is in Yorkshire, and in Essex. Those who sow in spring, must do it in the same manner, but the other way, except under very particular circumstances, is greatly preferable. If any chuse to cultivate this plant in the drill and horsehoeing way, there is no doubt but it will answer very well, for nothing can furnish it so plentifully with nourishment : and in that way also the surface of the ground would not be at any time so perfectly covered by the leaves as it is in the other, because the middle part of the broad intervals would certainly be free. The best practice in this way would be to plant it in double rows, with two foot partitions, and five foot intervals between pair and pair of rows. The number of plants would be less upon an acre, but probably the number of heads would be greater, because each plant being so well nourished would afford more, and they would be better in their kind.



## C H A P. XCIII.

*Of aniseed.*

**W**E receive aniseed from the Levant, where it is cultivated, in the Greek islands, and some other places; but it may be raised at home. Not only we are remiss in this article, but other nations, for the world is in a manner supplied from those few places. Not only reason and the little experience we have in gardens, shew the plant will live with us; but the more full and perfect experience of the fields where it has been sown, and has come up, and grown to a perfect maturity.

The plant which produces this seed, and is called the anise, is not unlike parsley in its manner of growth. It grows to two foot and a half in height. The root is long and white, but there is a great deal of difference in the shape of the leaves, those from the roots are composed of roundish parts, and those on the stalk are more divided; 'tis these latter that have most the aspect of parsley, and they are of a pale colour. The tufts of flowers are moderately large, but the separate flowers are small, they are white, and are succeeded each by two seeds which grow together. The whole tuft of flowers, which is what is called an umbell, has no surrounding leaves as those of many other kinds have; and the separate flowers whereof it is composed, have scarce any visible cup. Each flower consists of five little leaves, which are of an oval figure, and bend backward: in the center rise five filaments, each having at its top a little head or button; among these grows a single filament, divided into two at the upper part. This is the style of the flower, it grows upon the rudiment of the fruit, which is composed of two seeds joined close together, which ripen and separate when the flower is fallen.

## C H A P. XCIV.

*Of the cultivation of aniseed.*

**A**NISE is to be sown in spring, but the ground must be well prepared for it beforehand. Therefore let the farmer who intends to raise it, look out for a piece of ground during the summer, that he may go to work upon it in autumn. The proper soil is a dry rich loam; such a one as has a good deal of sand, but little clay, and a good quantity of fine mould in its composition. The best situation is in a warm valley, where the place is sheltered by hedges, and is not in the way of wet.

Such a piece of ground being chosen, let it be well plowed up in autumn, and a quantity of half rotted dung strewed over



it. Let the plowing be repeated two or three times between that and spring, that the manure may be well mixed; and then let it all be harrowed fine, and smooth as a border in a garden. It is then in a condition to be sowed; but the weather must be watched. Anise is a quick growing plant, so that it need not be hurried into the ground: the danger is that of the cold rains, which sometimes fall early in this season, and it may be easily guarded against these, by keeping the seed out of the ground till that period is over. Writers talk of the great tenderness of anise, and the difficulty of raising it: but it is all owing to their having sown it too early. They direct February, whereas it will succeed very well if sown in April.

There is no difficulty in raising anise in England, and little hazard, unless what rises from ignorance: this is worth searching to the bottom, because it may prove a very valuable commodity: the price is not great as we import it, but when we consider the vast quantity of seed which all these plants bear, we shall find that it will amount to a very considerable value from an acre.

The farmer is to see that he get good seed, the soundness is one great article, and the freshness another. Let him be very careful in examining the seed he buys; its weight and cleanness are tokens of its being sound, and the brightness of its colour shews best its being new. The seed is to be sown sparingly; and when it is come up, it is to be hoed by the hand hoe, the hoers cutting up weeds, and thinning the plant to about six inches distance.

In this condition they are to stand till they have flowered, and the seed is ripened, and the time for gathering them is just when it begins to harden. The best way of gathering this crop is by pulling up the plants: for they root very slightly. After this they are to be housed, that they may dry without waste, and the seed is then to be thrashed off for sale.

#### C H A P. XCV.

##### *Of caraway seed.*

**T**HIS seed is as well known as anise, and grows upon a plant somewhat resembling it. It may be cultivated in England in the same manner, but with less charge and hazard, for it is hardier; and yields the greater advantage, as it does not perish when the first quantity of seed is ripened, but lives several years. The caraway plant is four foot high; the root is long and white, and is of a pleasant taste. The leaves are large and very finely divided. The stalk grows up in the midst of these, and is hollow, striated on the surface, and divided in-  
to



to a great many branches. On these stand leaves like those that rise from the root, only smaller, all divided into very narrow and fine parts: at the tops of the branches grow tufts or umbells of white flowers; after which come the seeds, growing two together. The whole tuft has no leaves about its bottom, nor have the single flowers any cup, except so small a one as is scarce observable. There are two or three other kinds of the caraway plant, named by writers on botany; but only the common sort, which we have here described, is worth the husbandman's notice.

The proper soil for raising it is a deep, rich, mellow earth, the more like garden ground the better. If there be some sand among it, provided not in too large a quantity, it is not the worse, wherefore a rich loam will do. This land should be plowed in autumn, and again in the beginning of February: a week after this it is to be harrowed, and then it is ready for sowing. Let the farmer see he buys such seed as is sound and good. The quantity is seven pound to an acre. When this is sown as evenly as can be, it is to be harrowed in, and then left to shoot.

When the plants are three inches high, the hoers are to be sent into the ground, but they must, both in this and anise, be well instructed in the appearance of the plants, which otherwise they will be very apt to cut up among the weeds. They must hoe up the weeds, and thin the plants where they are too thick, cutting up the poorest, and leaving the others at eight inches distance. The plants will thrive after it in a surprising manner, and they may be, for the rest of the summer, left to themselves, for they will get strength before a new crop of weeds can rise. The crop is not to be expected the first summer. Some of the plants will run up to seed, and if so many do as are worth cutting, it may be done, but often 'tis otherwise: the farmer must not lay his account to have a crop the first year. The field is to lie the whole winter untouched: in spring it is to be hoed again, and the same in August, and soon after this last hoeing the seed will ripen. There will be a large crop, and the same for three or four succeeding years, which is to be cut up, dried, and thrashed for sale.

Having thus treated of the several particulars under this denomination, we shall give a few general chapters on the great article of sowing, and with that close the account of tillage and its objects.



## C H A P. XCVI.

*Of sowing.*

**I**N sowing two things are to be considered, the nature of seed, and the temper of the ground. Some kinds of seed will bear wet, others will be injured by it; and some land is fittest for sowing when wet, other kinds when dry. It is a rule among the gardeners to sow dry and set wet, but this will not hold altogether with the husbandman. His fields are a larger garden, and he must not be confined to such narrow rules. The temper of the ground proper for sowing, depends upon its natural condition; all lands should have some moisture when sown, but the driest should have most. A land naturally moist may be sown in any weather, but dry soils may be sown in weather that is very wet, provided the seed will bear wet. Wheat must be sowed when the earth is moist. It can hardly be too wet, for this seed not only will bear moisture, but requires it: on the contrary, rye cannot bear it.

Farmers observe the season for sowing, and when that is come, get in their wheat be the weather what it will, for this reason it sometimes will lie six weeks in the ground without any visible shoot. The first good rains bring it up, if they come in time: if not there is but a poor appearance, for often the greatest part will spoil with so long lying in the earth. Let our farmer in this, as in all other things, follow reason and experience, rather than a blind custom. Let him use the common season, if the common weather happen in it; if not let him stay beyond that time. Those who fixed the season of sowing wheat, did it because rains usually fall at that season; if any year it so happens that they do not, let him wait till they do: he will thus better observe the sense of the rule, than those who stick to the day.

Wheat is not the only kind that requires moisture: but most seeds succeed very well; nay, many of them best without it. Black oats require as much as wheat, therefore let the farmer never sow them but in such a season: barley does very well in a dry time, and all the summer corn in general. Nature takes care of the seeds of wild herbs. They fall at any time when they are ripe, and be the season what it will they grow. Some are lost; but enough remain. This is plain, because no kind of plant whatsoever has been lost since the creation. We read in very old authors of the herbs of their time, they do not mention a great number, but all they have described distinctly, are found to this day.

The later writers have been more curious in setting down  
the



the names and figures of a vast variety, and in the same manner all they have named continue in their places; or if they are lost in one, they are found in another. These are sown as accident directs, and they succeed; here is no regard to wet or dry, yet they prosper. This is true, but let it not mislead the farmer. Far from too much, there is too little care taken in the sowing of corn, let him be doubly assiduous not remiss.

These plants which nature sows at random, are only to keep up the species; the wheat sown by the husbandman is to be consumed in food in the far greater part: and after it has fed millions, enough is to remain for keeping up the species. This is a great difference, and requires all his care. It may be said in the same manner, that the earth serves for these seeds of herbs that are wild, without tillage, or any careful manner of placing them in the ground; they fall as chance directs, and yet they grow. The answer is the same, that a small supply only is wanted from them, therefore this casual way of sowing is enough; if much of the grain were required for other uses, then care and culture would be needful.

The creator of all things saw the condition of wheat, and those other grains he intended for the support of man's life, and he knew they would therefore have his care and labour for their production. The others which were of no such immediate use or value, he foresaw would be taken little care of, he therefore provided for their succeeding of themselves: and it is wonderful in what various and elegant manner. They are in general inclosed in a case, serving as a womb, in which they are retained till at perfect maturity, and which then opening discharges them to the ground. They therefore do not fall till ripe, and fit for growing; and they are suited to preserve themselves in a proper state, and keep in a proper place, in a surprising manner. Those intended to root about the mother plant are small and heavy, so that falling they shoot at once: this we see in henbane, and others. Those which are intended for spreading, are winged with down, as those of the thistles. Such as by their lightness would be carried away by every puff of wind, have hooks and prickles to detain them, as seeds of clivers, avens, and burdock. Agrimony seed also is rough, so that it lays hold of any thing. Many of these are intended for the banks of fields, where they could not lie but for these hooks and prickles, that serve to keep them in their places. The seeds of some, which are to be scattered at a distance, are lodged in cases or fruits, that toss them out by their spring in breaking, such as wood sorrel and the wild cucumber; and some, that they may not rise in clusters together, have a kind  
of



of wings by which they are influenced by the wind, to move about upon the ground ; the ash key and the pine kernel are an instance. As this provides against those trees rising close to one another, in which case they could not thrive, so the other is generally given where there is a creeping root. Wood sorrel runs a great way in the ground by the root, and therefore this scattering of the seeds to a distance is more useful. Though these take their chance as to the weather, and yet succeed, yet there are some that require to be sown only in peculiar seasons. Thus blue gentian will not succeed unless sown when there is wet, but nature has provided accordingly, for the seeds are lodged in a case that holds them firm in dry weather, but splits at the first drop of rain that falls upon it.

Thus nature provides for weeds by various means, though they be little regarded : corn is left to the care of man, because of its value, let him not therefore neglect it. It requires a particular caution as well as labour, but the trouble and expence are well returned. He who understands best how to employ his labour will have the best crop. Nothing is more inconsiderately done than the sowing in the common way. A certain time is fixed upon, without regard to the weather, which ought to be the chief point ; and in the usual way the seed is scattered at random, from the hand of an unskilful person, and covered unequally. It falls too thick in some places, and too thin in others : and in some it is buried so deep it cannot rise, while in other places it is burnt up by lying naked on the surface. Every seed has its proper weather for sowing its proper thickness upon the ground, and its proper depth at which to be covered : these are the three great articles. We have shewn the regard that is to be had to the weather, for the different kinds ; and the rules by which their depth and distance may be found. England had great obligation to that earl of Castlemain who brought over the original drill plow, or Sembrador, from Spain ; and the world as great to Leucatello, who invented it : but their services would have been of little use if not of late revived by Mr. Tull. They had slept many years, and would have been altogether lost and forgotten. His praise therefore is no less than that of the inventor or importer of the machine.

## C H A P. XCVII.

*Of the nature of wheat seed, and the particular manner of sowing it.*

THE reason why wheat requires a particular care, and a particular season for the sowing is, that it is a tender grain.

Rye



Rye is hardy, and therefore will succeed, under the same condition wherein wheat will come to little. Of all our grain wheat is least able to bear the severity of cold; and yet from its time of growth 'tis necessary to sow it before winter. It has therefore all that hard season to get through, and this is the difficulty. As it must live through the winter, the farmer is to defend it as well as he can against the cold, and the best way is, by taking care that the earth lie hard about it during that season. This is in a great measure provided by sowing it in wet weather, the soil then closing and caking upon it; but this brings on another difficulty. Wheat, of all corn, requires the most nourishment; and it cannot search for it by the roots, unless those roots can spread; nor can they do this except the ground be properly loose and free. Therefore, as the condition of wheat requires the ground to be compact about it in winter, it requires it also to be loose in spring. This is very difficultly to be managed in the common way of husbandry, but it does very well in the drilling and horsehoeing. The depth at which it is let in by the drill, gives the earth opportunity to close about its roots, and defend it from the frosts; and the breaking the ground between the rows, by hoeing in spring, divides the soil, and makes way for them to pass in search of nourishment. Therefore the drill and horsehoeing husbandry is most suited to wheat, which is the most valuable grain; 'tis fit the husbandman perfectly understand the nature of this capital grain, if not he will forfeit half the profit of his harvest by the sowing. There are general rules for sowing which hold true in most cases, but wheat is an exception to others of them, beside that we have named.

'Tis a rule to sow on the ground as soon as 'tis plowed, that the seed may have the advantage of the fresh tillage. This to most kinds is very great; but with wheat another method is to be followed. Let the land be plowed when it is dry, and let it lie till there come rains to wet it. 'Tis proper to wait for this advantage, though the earth lie three weeks before sowing, after the plowing. If the land be indeed a sandy loam, the clayey part of which is binding, 'tis best to sow it dry, as well as plow it in that condition. In this case let the sowing come directly after the plowing.

These are the general rules, but let them be understood with discretion: though the ground should be plowed dry for wheat, it should not be so dry that the dust should fly; and though it should be drilled wet, it should not be like hasty-pudding. Moderately dry and moderately wet is what we mean by the direction. The difference between ground broken wet



and dry, may be seen in banking. A bank made of wet earth will keep firm many years; when one of the same ground dry will moulder continually. Let the seed time be deferred till the ground is sufficiently wet, and the dry plowed land will never fail to produce larger crops than the wet.

The consequence of plowing wet is almost equal to that of banking; a piece of land plowed wet in November, will be harder in spring than one plowed dry in August. All ground grows hard by lying: but this effect of wet out-does that of time. When the land that has been plowed dry is wet enough for sowing, let it be once harrowed lightly, just to level it, and then sown.

Wheat may be drilled any time between harvest and November, but in general 'tis better to drill earlier than those who sow in the common way, than later. When wheat is sown early less seed is required: poor land should have more seed than rich, because more of the plants will be destroyed on the poorer land in winter. Beside the plants thriving better on rich land, will have each more stalks, so that one of them will be equal to many on poor ground.

#### C H A P. XCVIII.

##### *Of the proportion of seed wheat to the land.*

**T**H E quantity of seed corn sowed in the new method of husbandry is a very considerable article in its recommendation; the proper quantity for an acre of middling land is from four to six gallons, this will surprize such as are not used to that husbandry, but the very smallest proportion here named is often sufficient. If the land be rich, and be ready for drilling early, four gallons of middling seed will be enough. The danger of drilling it too thick is, that it will fall; and when too thin the quantity is often diminished farther, by its blighting in spring. When it is planted early less serves, because it is more safe; that which is drilled late being found, by all experience, more liable to accidents from worms and many other causes.

Where there is danger of worms, the proper caution is to plant it shallow. Wheat will come up if covered three inches deep, and it will stand very well if not deeper than an inch; therefore let the farmer proportion the depth to the particular circumstances and season of his sowing. The way worms destroy wheat is by eating off the thread that is continued from the grain to the blade. Worms lie deeper in winter than at other seasons, by way of defending themselves from cold, therefore when the corn is drilled shallow they never come near that thread. As the quantity in the drill method is much less than  
in



in the common way of sowing, the more care must be taken that it be preserved. The rooks are great destroyers, they must be kept off the land about the time of its first shooting. This is the only period when they are dangerous. Boys must be employed to fright them away. The farmer must not stay till he sees the blade up. It is true the rooks will not meddle with it till it has shot, but they see this before the owner. Just when it peeps above ground they devour it. They tear it up for the sake of the seed, which is then plump and full: when the shoot has been up a few days the flower is exhausted, and they will not meddle with it. That wheat is safest from rooks which is planted nearest harvest time, there is then a great deal of corn scattered on the ground, and they feed well. While they have plenty of this they will not look for the other.

C H A P. XCIX.

*Of sowing turnip seed.*

**M**ICHAELMAS is the best time for sowing wheat. Much sooner it cannot be sown; and it is not prudent to do it a great deal later. In turnips we are not to be so particular. They may be sown from May to August; the farmer is to guide himself by the nature of his land. In a moderate piece of ground, about Midsummer, is the best time; in poorer land they should be sown six weeks sooner, and such as is very fine, it may be let alone till six weeks later. Turnips, on a very good field, will be as forward if sown at this late time, as on a poor one at the earliest. As to the quantity of seed, we have observed, what a vast difference the drilling makes from the common method; four pounds is often allowed to an acre in the common way, and in the drilling method four ounces is enough. In the drill method wheat may be sown upon the same piece with turnips; managed thus. The turnips must be sown early, they will then be well grown by Michaelmas; and that is the time for sowing the wheat. The turnips being in distant rows wheat may be sown between them, the earth being properly broke for that purpose. Almost all the earth may then be taken from the turnips; and thus they may stand with the wheat during the winter. In spring they are to be pulled up, and the wheat is then to be left to take all the advantage of the ground till harvest.



## C H A P. C.

*Of sowing beans.*

THE season for sowing beans is February, and the most proper earth such as will retain some wet. The spring rains follow, and the crop seldom fails unless for want of a due moisture, so that it must be an unnatural season alone that can prevent their thriving. Provided they have this advantage they get a good first shoot, and no weather that comes afterwards can hurt them; the richer the land the better for beans, provided it have this firmness to hold the wet. A loamy field, with some good mixture of fine earth, is the proper place for this crop, few know the value of horse beans for want of understanding the proper soil, seed time, and manner of sowing: we shall endeavour to instruct our husbandman on each head, from the result of experience. We have mentioned the improvement of clayey soils by sand, a soil so amended becomes a loam of the best kind. These clays seldom fail to have rich earth among them, and though in their original and natural state they locked it up, and it was of no advantage, yet when thus divided by the sand, broken by tillage, and calcined by the sun and air, they become a very rich land, and are able to retain a great deal of moisture: these therefore are the best soils for beans. The next are loamy, with a good mixture of mould among them. Let a field like this be chosen for beans, let them be sown the third week in February; and if they have the advantage of a dripping spring, the crop shall be equal in value to one of barley.

We have shewn the advantage of horsehoeing to wheat, in causing a great number of stalks to rise from one root, and each to have a great deal of corn. The same effect is produced by this practice in respect of beans. I have counted ninety-five pods upon one stalk, all well fed and full of seed well nourished; and a common number is sixty or seventy on a stalk when thus managed. The land cannot easily be turned to a better account. As loamy soils are the best for beans, sandy are the worst, yet there are wet sands that have some clay in their composition, though not enough to get them the name of loams, which succeed very well with this growth. In these cases the seed should be always drilled in rows at four foot distance, and a farmer who manages properly may get a good crop of turnips between. When any one has a desire to raise beans upon a land that is not naturally suited to them, he must increase the quantity of seed, and be particularly careful in the sowing. Many of the plants will come to little; and if part  
of



of the seed be lost by carelessness in getting it into the ground, and the rest bear but a poor quantity, there must be a miserable prospect. Dry weather always hurts beans, and when they stand thin it destroys them. When too few plants rise weeds will come up abundantly, and get strength and over-power them. On good land three bushels will sow an acre, but it is better, when it is any thing less than the best, to sow four; and on soils that are poor or dry five bushels.

There are two ways of sowing them in the ordinary husbandry, by the broad cast; and plowing them in: for this last the seedsman follows the narrow wheel plow, and throws in the seed from his hand in a direct line, all the way along the furrow: this is called spraining them in. The furrow is left open in this way by the plow, but the next turn covers it, and the beans are buried to a good depth.

Another way of sowing, or rather planting horse beans is by hand: it is practised in several parts of England, at a moderate expence. Women do it, and the method is this. The land is plowed light, and the women draw lines in it at a foot and half distance. They have a dibber in their hands, and beans in their apron, and they work by the line; the dibber is an old spade handle cut off to five inches length, and tipped at the point with iron. They have this in their right hand, and they take out the beans from their apron with their left. They strike the dibber into the ground, and drop a horse bean into the hole. They thus plant the beans at about three inches distance, in rows eighteen inches asunder. This is a very proper position, and a regular method of planting them, and 'tis done with so much ease that the expence is moderate. When the whole field is planted they go over it with a harrow, which sufficiently covers the beans; and then give them two handhoeings before harvest. This is nearly of kin to the drill and horsehoeing husbandry, but it is not equal; as we have shewn: for this handhoeing only scratches the surface of the ground, whereas the other tears and breaks it to such a depth, as to invite the roots of the crop where the nourishment is most abundant.

In Wiltshire they plow lengthwise, never across, and sow their beans by the broad cast twice in a place, they then harrow them in, and so leave them to their chance. In the other places they don't harrow till about the time when the beans are just going to shoot, then they go over the ground carefully with the common harrow. This tears up the young growth of weeds, and breaks and divides the ground at the surface, covering up the heads of the beans; immediately after the harrow they draw over a moderate roller, which fixes the soil at the surface, and levels



levels all for the scythe at harvest. The drill method of sowing is best of all, and the due distance between the rows not only gives opportunity for horsehoeing, which vastly strengthens the growth, but the plants having a free passage for the air to their bottoms, blossom and bear fruit all the way down. This vastly encreases the quantity, and at the same time ripens them better. Though the horse bean is what the farmer means when he talks of his bean crop: yet this is not the only kind that is cultivated in fields, they sow five other sorts in the same manner about London, and in other places where there is a large demand, for supplying the markets; these are the Windsor and Sandwich, the Broadstock, the Lisbon and the Hotspur, this last is a small bean, but is valued for its earliness and good flavour.

There is also another kind brought into use of late; and this is properly the country farmer's concern: this is the tick bean, it is properly a horse bean, but is much broader than the common, and answers better on every occasion. This is best planted by hand with the dibber, and the rows ought to be at least two foot asunder. The common method of managing these is by the hand hoe, and it does a great deal of service, tho' not equal to what would be done by the horsehoeing. They give them two hoeings: when they first shoot up they come in with the hoe, and cut up all the weeds between the rows, and at the same time earth up the beans: then, when they are about six inches high, they come in and hoe them up again, this second earthing is of great benefit to the beans, and the weeds being destroyed at this growth, are rarely troublesome again.

Some have supposed, from hearing the husbandmen talk of small ticks and large ticks, that there were two kind of beans of this denomination, but this is not the case. There is but one kind of bean properly thus called. It is a horse bean of the size of the hotspur bean, and is hardy and very fruitful. What some call the small tick is only the common horse bean. The tick bean is more hearty and nourishing than the common horse bean, but as it is larger it requires longer drying. When this is done imperfectly in the field, the way is to finish it on a large floor in an airy place, or in a kiln. The safest method of keeping them is to split them and dry them afterwards; in this case they are never liable to any accident. They mix excellently with oats, chaff or bran, and are of great service to cattle. There have been times when bean bread was eaten for want of corn flour, and no harm ever happened from it: on the contrary, it was found to be more strengthening than any other.

End of the NINTH BOOK.

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B O O K X.

*Of the natural and artificial Products of the Farmer's Stock.*

CHAP.

1. *Of milk, and its natural production.*
2. *Of the nature of milk.*
3. *Of the several kinds of milk.*
4. *Of cows milk, and its general differences.*
5. *Of chusing a milch cow.*
6. *Of the quantity of milk yielded by each cow.*
7. *Of the times of milking.*
8. *Of the manner of milking.*
9. *Of ordering the milk in the dairy.*
10. *Of the vessels of the dairy.*
11. *Of setting the milk for cream.*
12. *Of skimming the cream.*
13. *Of the management of the cream.*
14. *Of butter.*
15. *Of churning.*
16. *Particular rules relating to churning.*
17. *Of the washing and making up of butter.*
18. *Of making butter from new milk.*

CHAP.

19. *Of salting of butter.*
20. *Of whey butter.*
21. *A method of taking off the ill taste of milk.*
22. *Of the use of the barrel churn.*
23. *Of cheese.*
24. *Of rennet or cheese bag.*
25. *Of new milk cheese.*
26. *Of a one meal cheese.*
27. *Of skim milk cheese.*
28. *Of cheshire cheese.*
29. *The way in which cheshire cheese is made.*
30. *Of making cheese like cheshire in other places.*
31. *Of making sheeps milk cheese.*
32. *To make a nettle cheese.*
33. *To make a running cheese.*
34. *Somersetshire cheese.*
- 35, 36, to 45. *Of the early use of wool, and methods of managing it in different parts of Europe.*
46. *Of hides and leather.*

The I N T R O D U C T I O N.

**W**E have considered that important article of stocking the farm, and acquainted our husbandman with the several breeds of those animals which he is to feed upon its produce for labour



labour or profit. And have since gone through those several articles by which he is to procure them food, and in which he is to use their service. This done, we come to treat of those benefits he receives from them in their several products, and to lay down the best manner wherein he is able to use them to his advantage.

We divide these products into natural and artificial, as they are of two kinds, properly coming under those two denominations; one part of them arising naturally, and being used in the condition in which he receives them; the other requiring art and management to bring them into the state that is fit for sale. Of the first kind are milk and wool; these he receives from the udder, or sheers from the back; and he may sell them as they are: the artificial kinds arise from the use or manufacturing of the former. Butter and cheese, though originally owing to milk, yet are not obtained without manual labour and art. These we call the artificial products of the stock; and under the one or other of those names, we comprehend the whole produce from these animals. The farmer of one place may be instructed by reading the practice of another. We propose therefore to lay before our readers, the substance of what others have practised; and upon the whole to build a system for the conduct and management of these important articles; which reason shall countenance, and, we doubt not, experience afterwards approve.

## C H A P. I.

### *Of milk, and its natural production.*

**M**ILK is separated from the nutritious juice of bodies deposited by nature in the udders of female animals, during their pregnancy, and intended for the nourishment of their young. After the young is born it comes in greater abundance: and it will be prepared and furnished by nature in that plentiful manner, so long as it is sucked, or any other way drawn at times: but when no use is made of it, the supply ceases; and the milk dries up of itself. We have mentioned the udders of pregnant females as the natural place for milk; but the curious have discovered, and sometimes accidents have shewn, that it is not limited to that sex, or that state; male creatures, both human and of the brute kind, have had milk; and females which have not been in a state of pregnancy.

The Roman charity so famous in history and paintings, is an instance of the latter in the human species: an old man confined in a dungeon, was supported by sucking the breasts of his daughter a virgin. So long since as the time of Aristotle, it was  
known



known that some men had been found to have milk in their breasts: and Cardan upon his own knowledge relates the same, averring, that there was such a quantity in one man, that a child might be nourished by it. Pliny relates the same of a man in his time, and Aldrovand of another. These authorities so numerous are not to be doubted; nor is the thing confined to the human species. We have a circumstantial account in the philosophical transactions, of a weather sheep giving suck to a lamb; and that not wantonly or for once, but in a regular quantity, and enough for the support of the young creature many months. Wonderful as all these accounts appear, there is not in reality any thing so strange in them, when the matter is fully weighed. Nature has provided breasts and udders, with their teats and nipples, for all females, younger as well as grown up; and to the males she has given the same parts, by way of conformity, though not intended for the same service.

Milk is a natural juice, and although prepared regularly at a certain period, yet being formed from the nourishment of the body, it may be produced at any other time; and as the nourishment of men is the same with that of women, there is no reason why it should not, if wanted, be supplied by one as well as the other. Sucking will make it continue to flow when it otherwise would have dried up; and there is not much more wonder that the same force should bring it to a place naturally destined for it, even at a time when it would not otherwise have come.

This method of reasoning, plain and familiar as it is, will very well explain the breasts of virgins affording milk on being sucked; and we shall not, upon a like rational enquiry, find it any thing more strange, that the same force should bring it into the breasts of the other sex, whether in human or brute creatures. In men the texture of the breasts is not very unlike that of womens, and the nipples are of the same structure entirely. We have no reason to suppose the resemblance stops here. Indeed anatomy shews that it does not, and therefore as the parts are of the same structure, and there is the same nourishment for the purpose, it is not strange that sucking should produce it.

The most plain reader may understand these reasonings; and so it is throughout all nature: hard words are only cloaks for ignorance. We believe it will from this appear, that far from discrediting the stories, they have heard or read of milk in virgins, and milk in male creatures, our impartial readers will join with us in opinion, that the wonder is rather that such things are not more common. It is not straining the point too far to say, that probably any virgin grown near maturity, or  
any



any man in health, would give milk if sucked some time for it; and the same is doubtless equally true of animals of other kinds. This seems to be a provision of nature, careful of all her productions, as a last resource in case of extream necessity for the tender and defenceless young of animals, which from accidents would otherwise be lost.

## C H A P. II.

*Of the nature of milk.*

**M**ILK is of the nature of chyle, that is, the nutritious juice separated from our food, and intended for the support and nourishment of our bodies. All our foods tend to the formation of chyle, and the purpose of nature in their digestion is the furnishing a sufficient supply of it: for on this the restoration and preservation of the fabric depend. Chyle is a thin white juice, consisting of the finest and most nourishing part of our food; and milk is properly speaking, nothing more than a thicker and richer chyle; when the two are compared together, there is found no other difference between them; therefore we may very reasonably conclude, that milk not only is made of chyle, but that it is made by a very natural and easy procedure. A quantity of chyle has been brought into the glands of the breast, and there some of its watery parts have been separated; and the remainder becoming richer by that means, has been left there ready to be drawn by the mouth of the young, or otherwise, in the form of what we call milk. Upon examination by glasses, we find it still consists of only a small part of real and rich nourishment, mixed with a larger quantity of a watery fluid; and this the progress of nature when milk is left to itself to spoil, or is managed usefully in the dairy also confirms; for whether milk become unmixed, as we may say by the course of nature, or by management for useful purposes, still the same thing is found; namely, a smaller quantity of rich matter, and a much larger of a watery fluid.

Milk viewed with powerful glasses, is discovered to consist of two different matters; the one white and rich which is kept separate in round drops, and the other thin and watery: this last is the more large quantity, and the other drops swim in it. When we make butter and cheese, we force a separation of those parts, which we could not see to be distinct in the milk, though this common operation shews they were so: the rich part makes the butter and cheese, and the other runs off poor and watery in the butter-milk and the whey. This is a proof of the truth of what Lewenhoeck first saw by glasses, and it is thus the common operations of our lives illustrate the truths of philosophy.

C H A P.



## C H A P. III.

*Of the several kinds of milk.*

**M**ILK is a richer kind of chyle. It is composed of more rich and solid, and more fluid and watery parts; and the operations of the dairy inform us farther. Philosophy shews us only two parts in milk, but experience discovers three: the buttery, the cheefy, and the wheyey. The buttery parts being of an oily texture, separate most easily, and get to the top. We find butter to be of the nature of oil, and oil will swim upon water. Therefore these three separate parts of which milk is composed, are of three different qualities. By first understanding them, we shall perfectly comprehend all the operations by which it is suited to our various uses.

The three parts are, 1. The oily; 2. The curdy; and, 3. The watery. The oily are the buttery parts; the curdy are the cheefy, and the watery are the wheyey. Nothing but the force of nature in the body of the animal, could blend these perfectly into one rich and nourishing fluid, fit for the tender stomach of the young. They are so mixed there, that they continue mixed in that manner for some time, after the milk is out of the body; but when they have once separated, either naturally or by art, we shall never be able to mix them so again. Butter, cheese, and whey were contained in the milk, but all our chymistry will never be able to mix these three into milk again.

Milk differs in various creatures according to their diet, their construction of body, and the particular structure of those parts in which it is formed. The great end of nature in the production of milk, is for the nourishment of the young; she knows, or to use more proper words, God whose immediate and regular care in the guidance of the world, is what we call nature, knows best the structure of those young and tender bodies; and he has accordingly provided in the breasts and udders of their dams, a nourishment suited to them. In some creatures more of the watery parts of the chyle are separated, and in others fewer, according to the structure of the vessels; and in some the chyle comes more watery to those glands that separate it, than it does in others: why otherwise should it be, that the milk of the cow should be so rich, and that of the ass so poor, when both eat the grass of the same pasture.

Physicians use asses milk to restore decayed constitutions, because it is poorer than cows, for the stomach in those persons is not able to bear the rich milk of the cow. The different construction of body, and fabrick of the vessels occasion milk to be



richer in some creatures and poorer in others. Having premised this, we shall proceed to consider separately, those several kinds that come under the farmer's consideration. These are four: the cows, the asses, the goats, and the sheep: a fifth might be added, for the milk of the mare is used in some places; but the first named kind is the great and principal concern of the farmer, and the support of the dairy.

As to the preference of asses milk above that of the cow, in the relief of human kind, the reason is shewn in nature. Let the milk of our own species be compared with that of a cow, and that of an ass; and the asses milk will be found to resemble it much more than the other. As it is commonly the misfortune of persons afflicted with such disorders as require the assistance of milk, to have such sharp juices on their stomach, as turn it to curd; the remedy is to sweeten or take off the sharpness of those juices: physicians prescribe various things for that purpose, but there is nothing equal to chalk ground to a very fine powder, and given in a little of the milk.

#### C H A P. IV.

##### *Of cows milk, and its general differences.*

**C**OWS milk is the richest of all the kinds, and the most profitable: its products in butter and cheese, being also preferable to those of all others, not only in quality but in quantity: two articles which constitute the highest use and value to the owner. The milk of the cow is supposed to vary according to the colour of her skin, but this is an idle observation. There is an old saying, that red cows give the best milk; and black cows bring the finest calves: but we can assure our reader that there is not the least truth in either of these maxims. We have seen as much and as good milk from black cows, as ever was produced from red; and we may call all Smithfield to witness, that the value of the calf is not in the least dependent upon the colour of the cow.

In a former part of this work, we delivered rules for the choice of cattle for their several purposes. In general, the cow to be chosen for the dairy should be large, big boned, yet well shaped, and of the biggest breed. This was always the choice of the cow, and this suits her as well for the shambles as the pail: when the breeds of cattle were kept more entire, Wiltshire was the place from whence this large kind principally came, and the breed there was mostly red: from hence it became usual to call the Wiltshire breed, the red breed; and thence instead of saying the Wiltshire cow gave the best milk, people used to say the red cow gave the best; those two words  
signifying



signifying at that time the very same thing. An error or confusion of speaking of the same kind, gave origin to the vulgar notion of the black cow bringing the best calf. The Lancashire breed were famous for their calves; and they were generally black: thus a black cow, and a Lancashire cow, became two expressions for the same thing; and when they meant to say, the Lancashire was the best for a calf, they named the colour, and not the place.

This has been the occasion of the vulgar error, and there is no more truth at present in the preference of the red cows milk, than in any idle common saying. While the breeds of kine were kept distinct, there was some meaning in it; though in reference to the colour, it was only accidental; but now the breeds are so mixed and confounded by introducing one among another, that nothing certain is to be deduced from the whole matter. There is an article which does in reality make an alteration in the milk of cows, and that is the pasturage, and manner of feeding: this we have, in general, considered already. The reader will find it in our discourse on the cow kind, to which we refer him to avoid repetition.

#### CHAP. V.

##### *Of the chusing a milch cow.*

**W**E have before given at large the marks of cattle, which are best in their several kinds; but we shall here add for the service of the dairy, such particulars as are of immediate reference thereto.

Having fixed upon a cow that is large and well shaped, let the housewife examine whether she be gentle and kindly. There are in these creatures differences of dispositions, as well as among ourselves, and it is in vain to think they can be altered. The cow being a creature that must be always about the house, her gentleness is a very essential point; and if she be of a very unruly disposition, it will reduce half her value.

The marks by which a cow may be judged to be formed for plenty of milk, are a large and handsome udder, with a proper number of teats, which is four, with no additional or ill shaped ones; but these four all long, thick, and small at the ends. After the udder, let the neck be examined, this should be thin, and should have a large and hairy dewlap. The horns are by many supposed to denote a large quantity of milk when they are short and crumpled, nor is this mark to be utterly neglected. The best Dutch and Alderney cows have these short and crumpled horns, and they are superior to any other for the service of the dairy. The horn being an essential



mark of the breed in these, may therefore be considered as a mark of plenty of milk.

When cows are to be purchased for the dairy, it is material to have them all of the same kind or breed; and to take care the bull be of the same breed also. The breeds are at this time sadly mixed and confounded in England; but as the number cannot be had entirely of one particular kind, let them be as near as possible of the same make, size, and shape. The colour is of no consequence. Let his whole care be employed to have them all good, and like one another: they will herd the more kindly together, and he will have a breed of his own better than what he at first purchased.

We have one thing yet to mention, with respect to the choice of a cow for the dairy, which is often in the housewife's mouth, and should be always in her mind: this is what they call depth of milk. They mean the quantity the cow is like to furnish: and there are ways of judging this, without error. A cow gives the largest quantity of milk, when she has newly calved: let the produce be well examined at that time; for if it be deficient then, it will never be better. There are cows that have more, and others that have less milk, without any visible reason for it; therefore in this, only experience can guide. The owner should keep or dispose of his cows accordingly: so that by degrees he will exchange or sell, and purchase again, till he have at length not a cow in his yard but yields as much as a cow well can. If the difference in a single cow be something, 'tis very great in the produce of a number; and this is a certainty, the quantity of milk does not depend upon the quantity of food, though the quality of it often does upon the nature of the food. A cow that is starved will not yield much: but if a couple of cows be watched, one of which is deep in milk and the other not, she that is the least profitable, will be found to consume as much provender as the other.

#### CHAP. VI.

##### *Of the quantity of milk yielded by each cow.*

**T**HERE is also great variation in milk, in respect of the age, time, breed, and size of the cow, so that it is not only difficult but impossible to fix any standard of the quantity a cow should, may, or ought to yield: yet that the owner may form some guess whether his dairy be supplied moderately, poorly, or very well, we shall give some general calculations of what may be expected. Not only the nature of the cow will make a difference in the quantity of milk; but the time of her calving. Let not the farmer therefore think the less of a general



neral rule because there may be an exception to it, from the particular constitution of the cow; all general rules admit some exceptions. Let him observe what milk his cow yields soon after calving, whether it be more or less, and mark her down accordingly: but though he set down that which yields a great deal at this time for keeping, and that which yields but little, for sale; yet let him continue both in his yard through the year, and examine them as they go on.

Often a cow that gives a great deal at first, soon falls off, and yields less than common; and some go dry a month, two months, and some three months, before they calve again, whereas others will yield their quantity to the last. The same cow that is deep in milk once, will continue so; and she that one year gives little, will not be easily made to yield more another. It often happens, that one of those which yield a great quantity when they have first calved, will grow dry ten weeks or three months before calving again; and one which yields moderately at first, will continue it till the very day of her next calving. When a cow yields but little at first, she can never be worth keeping for the dairy, and therefore should be disposed off at once, and her place in the yard supplied by one more profitable; but a cow that yields moderately, though not greatly, and continues it the year round, may be worth more to her owner than one of those that yield a great deal at first, and grow dry for several weeks. This must be regarded; for the preference of one of those cows over the other, cannot be made without a computation of the whole produce for that length of time. A great deal depends as to the quantity of milk upon the time the cow is to calve; and as this makes so great an alteration in the annual produce, we cannot state the account without it.

The best and most favourable time for calving, in order to yielding the greatest plenty of milk is, when the pasturage is springing in all its strength, for then it will make the greatest supply. Therefore those who wish for abundance of milk, are happy if their calves fall in the end of March, or the beginning of April, for at that season the grass is in its fullest springing strength. The calves at this time are not profitable for rearing, because they must be fed upon the cow's best milk; but an early cow, the calf being sold to the butcher, is vastly preferable in point of the abundance of milk, to one that is later.

To speak of the milk in its most favourable time for quantity, and under the best circumstances, we will compute that of a new milch cow first turned to grass in April. The produce of such a cow may be computed between five quarts and



twelve at a milking; and many accidents which make this difference have causes so beyond our reach to know, that it is often impossible to guess any thing before-hand. Three gallons, Winchester measure, at a time, is a very great and rich produce; two gallons is a very fine quantity: a cow that gives five quarts at a milking, which we have set at the lowest worth keeping, is a very good one, if she will continue it the whole year round; so that she is worth trying: but the cow that yields less than a gallon is to be rejected, and her place supplied by another. In general, the cow may be said to yield very well that gives a gallon and half at a time, if there be a proper continuance of that quantity. If this be rightly managed it will yield a sixth part cream, that is, one quart of good rich cream for every time of milking each cow; and this will yield very well a pound of butter.

## CHAP. VII.

### *Of the times of milking.*

**T**HE two great points upon which the profit of a dairy depends are the hours of milking, and the proper ordering of the milk when brought into the house. The first may seem a small concern in comparison of the other, but those who have had experience know it is of great importance. A cow should be milked twice in the four and twenty hours: there are those who approve of three times, but upon trial I have found that the quantity of milk obtained at twice milking at twelve hours distance, has been more than that got by three times milking at six hours distance in the day, and leaving the night for rest.

This last practice, however recommended, proves on trial to be erroneous: 'tis only a teasing of nature: 'tis expecting what cannot be performed, for a supply worth taking, or needful to be taken, cannot be made in less than twelve hours: beside, nature loves regularity; and in our way of two milkings in the four and twenty hours, each may be at twelve hours distance; whereas in the other, the common way is to have two intervals of only six hours each, and one of twelve. Those who understand the bodies of animals, know there is not this difference to be made between the hours of eating and rest; for though the creature eat only in the day, digestion goes on all night, and therefore the times of milking ought to be at regular distances. This is shewn by experience, because we find a cow with an udder full in the morning after sleeping, as well as in the evening after the whole day's feeding.

There are cows that it is said require three times milking in  
the



the four and twenty hours, because otherwise they will shed their milk: this would seem an objection; but from all that I have seen, the necessity has been owing either to a custom of doing it, or to some distemper in the udder. What nature has been accustomed to, she expects; therefore if a cow have been used to be milked thrice a day, she will require it; but the quantity will not be at all more than if she were milked only twice; as to her shedding the milk if not taken at these times, it is to be consider'd as a disorder, being certainly no other; and what a sickly or distempered creature requires, is not to be made a rule for the management of one in health.

Having established twice in the four and twenty hours, as the proper periods of milking, the next thing is to settle at what time it shall be done. But this is liable to uncertainty. In many places there are certain stated hours for the sale of milk, and when any considerable quantity of it is intended to be disposed of that way, the times of milking must be adapted to those hours: thus in and about London, and other large towns, there are certain hours at the which families are used to take in milk; and the retailers are used to have it at the hours just before; so that the professed cowkeeper, who intends this use of his milk, must accommodate the times of milking accordingly. The country farmer who keeps his dairy for his own use, and sets the greatest part that his cows yield for cream, may take what times of milking he pleases; and then it is his business to chuse such as are most natural. In summer, the most natural times are morning and evening: between six and seven in the morning, and toward seven in the evening. There are no hours at which the udders of the cows are so naturally distended with milk; consequently none at which it is so much an ease to themselves to milk them; or at which they yield so freely. The morning gives the milk formed in the whole night's rest and digestion; and the evening gives that made from the abundant food of the day; part of which, from the quantity taken in, must be converted into nourishment at the time: the remainder during the hours of repose.

As the days lengthen toward Midsummer, the hours may be a little earlier and a little later, but not much; as the days shorten after Michaelmas, they must of necessity be changed for such as are considerably later in the morning, and earlier in the afternoon. As to the third time of milking, those persons who approve of it, generally make it six hours after the morning milking, which places it six hours before the evening time in summer, and makes it about the middle of the day. We have shewn that it is prejudicial to the creatures, and of no ad-



vantage to the farmer ; and as it requires more trouble and attendance of servants, it necessarily brings on more expence, which is another disadvantage. Milking cows three times a day, makes them dry up the sooner. I had been led to believe at one time, that it would be a way to keep them in milk the year round, and made trials in my own stock, carefully minuting down the observations, but the effect was exactly the contrary : so that seeing the matter in all possible lights, this third milking is a disadvantageous practice.

I have met with some farmers who have been strongly of opinion, that the cow's keeping in milk to the time of her calving again, was not to their advantage ; for that the milk being drawn away all that time weakened the calf. This is another of those specious reasonings which nothing sets aside but experience. I have examined and observed this difference in respect of the calves, not once or twice, but many repeated times, and can assure the farmer, that a cow's yielding milk to the very time of her coming again, is no disadvantage to the calf that is to come, but rather a help. A calf in the body of the cow is more likely to have too much nourishment than too little ; and for one which comes into the world poor and starved, twenty come full of gross humours. Want of nourishment is a fault soon mended, for the milk is rich and abundant, so that rarely any harm happens from this ; whereas the bringing into the world with them an abundance of humours and a grossness of habit, is commonly their destruction. Therefore it is greatly to the advantage of the farmer, that his cows should go the year round with milk, and consequently it becomes his interest to watch and observe them the whole time.

#### C H A P. VIII.

##### *Of the manner of milking.*

**T**HIS may seem a consideration too trivial for such a work as ours, but we shall not neglect it ; nothing is trivial that may prove of consequence ; and it is owing to this vanity of over-looking things of importance, under the name of frivolous and unworthy consideration, that the greatest part of the writings on this subject are useless. Milking is very trivial and very easy ; but 'tis not enough understood. It is entrusted to persons who have little sense or consideration, and who learn it they don't know how ; nor does the owner concern himself whether they do it well or ill. There is a great deal of difference between handling the teats gently and roughly ; and some



some knowledge is required to tell how the milk shall be got with most ease to the creature.

Milking, when carefully performed, is an ease and pleasure to the cow; but it may be so managed, and it too often is, that 'tis a pain and torment to her. There are cows naturally ill-conditioned, but these are not common; the greater part of the accidents that happen in this way, and are laid to the fault of the cow, are owing to the rough and ill conduct of the persons employed to milk her.

The farmer is not unfrequently distressed by the disorders of the cow's teats, and the hedgehog is now blamed, as the fairy used to be formerly of being the occasion of those disorders; in general, the urchine is as innocent as the spirit; and the disorders are owing to hurts in handling the teats. When the milker goes to her work she must take the near side of the cow, and begin by gently handling and stroaking down the teats; and from time to time she must moisten them with milk, to make them supple and pliable. By this they will be brought to answer her touch much better, and will yield the milk more readily and freely, and that without any pain to the creature. The quantity in the udder is a burthen to the cow, and she wishes earnestly to be relieved from it; but if that be done with harshness, so as to occasion more pain for the time than the load of milk, she will avoid it: on the other hand, if she be milked kindly and gently, beginning as we have directed, not only the easing her of the load is a relief, but the very manner of doing it is a pleasure. Every mother who has given suck knows there is a pleasure in performing that office to the infant, independent of any thought of the mind: this pleasure is in the nipple itself, and this the whole creation of females that give suck have; and it is the same in milking.

To the rude method of handling the teats is owing a great deal of the ill disposition of some cows; and to the kind and gentle treatment others receive that they are gentle themselves. A cow that is well fed will have her udder full at certain times, and when she knows she can be relieved from that load without pain, she will come of herself to the pail, and will stand with satisfaction. We have said in what manner the milkmaid is to begin her work, and shall add how she is to continue. She must not fix herself, nor set her pail firm to the ground, till she has got the cow to stand sure and quiet: these creatures are often restless in the beginning, but they will stand still enough when the milk has come for a little while freely. This must be watched, because the milk that is got will be  
otherwise



otherwise in danger. The cow is a heavy creature, and a little kick of her foot will bring the pail down.

When she is once settled, and the milkmaid is seated, and all goes on for some minutes right, there is less danger, but still the woman must be upon her guard, a cow may start at any time, and she must have her eye upon all her motions, and her hand upon the pail, ready to remove it on occasion, otherwise the over-turning of a pail is very easy, and the milk may be all lost in a moment, that this careful eye might have saved. When the cow is quiet and seems pleased with the milking, let the woman go on boldly; that which would have pained the creature cruelly at first, will not hurt her at all now, the teats have been handled, moistened, and rendered supple; let her therefore now pull and strain them freely, and draw as long as any milk will come.

The worst fault a milker can be guilty of is, the not doing it clean and thoroughly. Let the farmer or his wife frequently see to this: they should give all their milkers orders to take care, that not a drop of milk be left in the udder when they leave off; and they should see at times, when they are at their work, whether those directions are punctually followed. If there were nothing but the loss of so much milk as is left in the udder, that would be some consideration, for in a number of cows it would amount to what was considerable; and this twice a day would, in the year's course, make a great diminution in the profits of the dairy: perhaps this alone would make the difference of four or five cows in a year, and the farmer knows the value of their keeping well enough, to be sensible what a fault that would be. But there is a greater consideration: for there is nothing that tends to keep a cow so full in milk, as the constantly milking her quite clean. This depends upon the course of nature in furnishing the udder with milk, as we have shewn. While it is drained nature gives a continual and constant supply, whether that draining be done by the mouth of the young or the hand of the milkmaid; but as soon as no more is drawn no more is provided. This is the case at large when the young dies, or the creature is any way left untouched; and the same thing holds good, in a proportioned degree, when she is carelessly milked, and the udder is not well drained. When that is perfectly emptied at times, nature goes on vigorously with a supply; but when it is done imperfectly she performs her work languidly, and there is not that free and full supply any longer. The farmer knows the importance of keeping his cows deep in milk, and a long time in it;



it; and it is fit he should thoroughly consider how much that depends upon the milkmaid's doing her duty.

Another caution to be given to all milkers is, that they make themselves as familiar and friendly with the cows as possible. By gentleness and kind treatment they will come to know them, and will go to the pail like rational creatures. While they are milking, common discretion will teach the person not to do any thing to startle or frighten them; and it is a good caution also to let them go quietly and easily away. I have seen many drive their cows away hastily and roughly, as soon as they had done, as if they never were to have any thing to do with them again. All creatures have memory: the cow does not forget this; and it makes her shy or troublesome the next time.

### CHAP. IX.

*Of ordering the milk in the dairy.*

**T**HE farmer has seen every article necessary to be done in obtaining his milk from the cow, let him now take care of it when he has got it; he has taken the proper measures for having the best cows; for getting the most from them; for keeping them long to it; and for avoiding mischief in the drawing it: we will suppose it therefore in the pails, and bringing home; and that he is desirous to make the dairy fit to receive it in the best manner.

The first thing in a dairy is cleanliness. Not only all the vessels but the floor, walls, and cieling; every thing that is in it, and every thing that is about it, must be managed with the utmost nicety of cleanness, or there will be continual damage and loss. The dread that should always be uppermost in a dairy is of sourness; and to keep things from souring, the receipt is, keep them clean.

Milk will at the best keep but a little while. All the art and all the care in the world cannot preserve it long: it will become sour, and there is the great damage. When it has once got sour it will spread the mischief: this is what the mistress of the dairy is to employ all her care to prevent; and the far greatest part of that care centers in the same point cleanliness. The foulness of a dairy is usually from corrupted milk or cream, and this must be cleaned away perfectly, for it will otherwise not only communicate itself to whatever is near it, but will infect the very air of the room, to the prejudice of the whole quantity that is brought into it, and of every thing that is going forwards. What the old housewives used to attribute to witches and fairies, was in reality the effect of something sour left in the dairy: this was the natural and real cause, but the



the effects of it are so great and so perplexing, to such as do not know the cause, that no wonder they thought witchcraft had a hand in it.

Here lies the first article of cleanliness, which is to take care no spoiled remains of a former business hang about the dairy; that nothing sour remain in any crack or crevice; for this end all the pails, pans, and vessels, must be daily cleaned; and for this reason glazed earthen ware is preferable to any other materials for them, because nothing sticks to it, there are no crevices in it, and one may always see whether it be clean. Those who are at all acquainted with the business of a dairy, know how nice and ticklish all the works of it are; therefore let them take care not to add to the hazard by foulness. We have mentioned the remains of any thing sour first, because that is a mischief that spreads so quick and so far, but we are also to caution the housewife against grease, dirt, or filth of any kind whatsoever; for every thing that does not belong to the work of the dairy hinders it. There is no way to clean and sweeten the vessels, but by scalding them with boiling water, and then setting them out in the air: the first cleanses off all filth that is visible to the eye, and the latter removes any taint by purifying and evaporating all that remained about them. There is nothing equal to the sun, wind, and air, for purifying things after proper cleaning, and this practice should be used in the dairy every day, whether the things appear dirty or no; there may be filth about them that is not seen, and the least of it will do mischief.

## CHAP. X.

### *Of the vessels of the dairy.*

**T**HE use of the dairy is to make from the natural milk, such products as the farmer shall find turn best to his account; and the several vessels employed in it all tend to that purpose. These we are to consider in two lights, with respect to their form and their materials. As to their form, we are not ignorant of the many new inventions that have been started for the facilitating the operations of the dairy; nor do we utterly advise the farmer from regarding them: but this caution we shall give him, that he do not rely too much upon the words of their inventors, or of those who have so warmly recommended them. These have been in general people of ingenuity, but of no experience. They have seen the conveniences that might attend something of the nature of what they proposed, but they have not perceived what might be the inconveniences of their own particular inventions; therefore the practical dairyman, is



to try before he approves: he is obliged to those gentlemen for the hint, but he is to determine for himself, for he can do it much better than they, whether it can be reduced to practice.

Thus the reasonable husbandman will consider all that is offered for the improvement of his profession, neither rejecting at random, nor adopting without proof. Many things appear feasible in the closet, that are impracticable in the field: there is therefore no way of judging of them but by the help of that experience first, which their ingenious inventors wanted; and afterwards, if this experience joins in the opinion, then to bring them to a trial. 'Tis thus we advise the farmer to consider the new improvements of a dairy; and having given him this rule of practice with respect to the new, we shall proceed to inform him in the management of the old: these are sure; and to confess a truth disagreeable perhaps to the inventors of new schemes on this head, I have never yet found upon trial, that any others, with all their specious promises, exceeded them.

People of fortune who have amused themselves with the pleasures of a dairy in the country, have covered their walls with Dutch tiles; and had their vessels of China; and this is extremely right. As to the vessels, China are in this respect as good for use as glazed earthen ware, but not in the least better, for they are covered in the same manner with a glazing; and so a vessel be glazed, and the glazing whole and without flaws, 'tis no matter whether it were done in the East Indies or at home. There is a difference in the materials used in the manufactures of Europe and the east, but it is not material in this consideration. Our glazing for these vessels is made of lead, and theirs is only a kind of earth mixed up in water, but the effect is the same. Either is a glassy or shelly substance which the milk cannot penetrate, and therefore they equally answer the purpose. As to the covering the walls with tiles it is certainly right, as it answers two purposes, both very essential to a dairy, cleanliness and coolness. I have seen a dairy in Wiltshire lined throughout with lead, and it had also a very good effect. The expence of this last method will appear considerable at first, but taking in the whole account nothing is so cheap. It lasts from generation to generation without repairs, and it has always a very considerable intrinsic value: so much lead is worth so much money at any time.

The usual kinds of vessels are three, earthen ware glazed, wood naked, or wood lined with lead. As to the first we have spoken, the second is very good, but it has less natural coolness, and is not so easily made clean as the earthen ware; the



the lead has all the advantage of coolness, and may easily enough be kept clean. The difference is not very great, but the reason will easily be seen in what we have here said, why we give the preference to the earthen vessel. Where the dairy lies low, and is in itself very cool, wooden vessels do better than elsewhere; and where there is a very great business carried on, there is convenience in wood lined with lead, because vessels may thus be made of such a form and bigness, as cannot be had from the potteries. The shape of the vessels should be broad and shallow: this answers two purposes: it makes the milk yield the largest quantity of cream, and it keeps it the longest from souring. A quantity of milk under the same circumstances otherwise, will always sour the sooner, the deeper it lies together in the vessel.

#### CHAP. XI.

##### *Of setting the milk for cream.*

THE dairy is now ready for the milk, and that is coming home in pails upon the shoulders of the milkers, the vessels in which it is to be set are placed ready to receive it; but there is one thing to be considered previously to its being put into them. We have taken care there be no dirt in the dairy, let us use the same precaution that none come into it from the field. Too much cleanliness can never be recommended to the milk-maids, but let them take what care they will, they can never keep their pails perfectly free from accidental foulnesses. The hairs from the cow will fall into them, and other little matters of the same kind may also. All these, however they are blended among the milk, would rise with the cream, and not only disgrace the housewife, but disturb all the operations that are to follow; for we have shewn that the least filth will perplex and teaze the whole management.

To prevent accidents of this kind the milk is to be strained; and this is to be done in a very easy and familiar manner, by means of what the housewife calls her straining dish, or as they commonly speak it the syle dish. This is a wooden bowl, with its bottom cut out, and the opening covered with a piece of fine clean linnen cloth. This bowl must be every day scalded, and set out in the air to sweeten like the rest, and care must be taken that the cloth be always perfectly clean. Through this dish the milk is to run into the several vessels prepared to receive it, and then it will be perfectly clean and pure, for the hollow'd bottom will stop the smallest solid particle, and thus nothing but the milk can get into the vessels.

Thus far then our housewife has provided with care and regularity,



gularity, her milk is pure, and is in vessels perfectly clean: there is no danger of any injury to it, and 'tis now to be left to nature. The dairy is cool, clean, and quiet, this is all that is needful to promote the gathering of the cream: properly speaking nothing can be done to promote this, for it is a natural procedure, and must go on in its own way, all that can be done is to prevent dirt, heat, or disturbance; and this we have contrived in the structure of the place. The milk is composed of different parts: these are kept mixed while it is in the body of the animal, but they separate one from another soon after they are out: this is that separation which prepares for the operations of the dairy. The rich and fatty part comes from the poor and watery; that is, the cream rises to the top, and leaves the thin part at bottom. The broader and shallower the vessel is, the more freely, easily, and readily this separation is made: that is, the sooner the cream gets to the top, and the greater quantity there will be of it, these are the two great points the housewife desires.

## C H A P. XII.

*Of skimming the cream.*

**W**E are sensible how lightly many of those things are in general looked upon, that here make the subject of distinct chapters, but it is to that want of consideration of what are called trifles, half the disappointments and losses in a dairy happen. Every housewife knows when her cream is risen, she is to skim it off: that is true, we do not take up her time in telling her that she is to do it, but we are about to acquaint her how she shall do it to the greatest advantage; and from what we have seen of dairies in some parts of this kingdom, no information relating to the farm is more necessary. We have recommended cleanliness in every article, but here we are to repeat that lesson. There is nothing that requires more nicety than the skimming off the cream, nor any article in which a little dirt can do so much damage.

We will suppose the milk to have been brought in in the morning, according to our directions for the summer milking, about seven o'clock; toward afternoon let the skimming dish be cleaned and got ready, and also the vessels that are to receive the cream. The skimming dish should be of a convenient size for the hand, not too deep; and thin at the edges. The time that milk should stand is a point in which few are agreed, and about which most err. In summer ten hours is in general enough for milk to stand. Therefore this milk having been brought in at seven in the morning, will be ready to skim at five in the afternoon; and this will be a very convenient time to the housewife,



housewife, because what she is now doing will prepare for the evening milking.

Many let their milk stand longer in summer, and accordingly vary according to the circumstances at other times, but by what I have found from repeated experience, there is no rule so proper. 'Tis a nice point, and of great importance, either way an excess or defect may be of much damage; if the milk be skimmed too soon the housewife has not her full quantity of cream; and if it stand too long the butter will suffer. When milk stands too long without skimming, the cream gets a thick head, and is untractable, and the butter that is made of this is always bitter. I have known this in instances out of number, and when I have convinced some housewives that it was owing to letting the milk stand too long, they have tried every method that could be thought of to prevent the effect, but in vain: I have known them boil the cream that was thus taken from milk which had stood too long, in order to prevent this ill taste in the butter, but to no purpose.

What all the pains and care imaginable cannot remedy in this, as in many other cases, may easily be prevented, and that is the lesson which we give to the housewife. Prevent the damage by skimming in time. Let the milk be all skimmed at five o'clock in the afternoon, and let the cream be put into a proper vessel. The best is an earthen pot well leaded, with a cover. When it is put into this, let it be set by in a close cool place. An hour or more has been employed in this, and in cleaning the necessary vessels, and by that time they are got in again and set in order 'tis seven o'clock, and the milkmaids come in loaded from the evening's milking. This milk is to be strained and managed exactly in the same manner as the first, so there needs no particular direction on that head; and we shall, to avoid repetition, suppose the same business gone thro', and the milk all set as the first.

The housewife may now be quiet for the night, but let her take care to be up early in the morning. The next article to cleanliness is early rising; and it is need she be up, for the milk she has set over night will be ready for skimming after ten hours, or half an hour more, that is, by five, or soon after five in the morning. In general it will be best to allow half an hour longer standing during the night than in the day, because the night is cooler; and experience shews that the warmth of the air has a great deal of effect in the throwing up of cream. In this manner the cream will be taken off from the evening's milk; and all got ready for the reception of that of the morning, by that time the milkmaids come home with it: and thus  
the



the whole round of that important article, the obtaining, setting, and skimming the milk, will be managed without the least trouble or perplexity.

## C H A P. XIII.

*Of the management of the cream.*

**W**E left our housewife with her pots of cream, and her dairy work going on with due regularity, we must proceed to advise her how to manage the produce in the best and most satisfactory manner. There is need of great caution, and that for the plainest reason in the world, which is, that convenience would naturally prescribe the keeping it longer than it is found in effect safe or proper to do. The weather makes a great variation in this article, and we are to observe also, that there are artificial ways of assisting nature in preserving it. However, as pure sweet cream, in its natural condition, is preferable to the best that is preserved in whatever manner by art, we shall first give the housewife her lesson how long she should, and how long she may keep it naturally; and afterwards inform her what may be done in the keeping it longer by art and management.

The finest and most excellent butter is that which is made from cream that has not stood above ten hours in the summer; but in winter it may be kept much longer without damage. When we name ten hours, it is by way of limiting the space in which it is quite perfect; for butter that is made from cream ten hours old, or from such as is just skimmed is altogether the same. After this, in summer it begins to suffer some change, but it is little for the two succeeding days, only in general the newer it is the better.

The season makes so great a variation, that cream may be kept very well twice as long in winter as in summer. In summer it may be kept without any material disadvantage two days and a half; and in winter it may be kept in the same condition five days. The housewife who intends to have credit in her butter, if she takes care not to let the milk stand too long before it is skimmed, may very well keep it thus long without any particular management; but if she intends to have more of it together than can be got from her stock of cows in that time, or to churn only at certain times, which require the cream to be kept longer, then she must use some art to preserve it. It may be necessary to observe, that in making butter for sale in large quantities, there is no objection to the cream being kept longer. In this case it turns sour; but the butter is not the worse for market, unless it have been over-heated or otherwise ill managed in the churn. The fine butter for present use should always be



made of perfectly fresh cream; but for this marketable commodity the other is rather preferable; for experience shews that butter made otherwise under the same advantages, keeps better when the cream has stood to be sour, than when it was perfectly fresh; unless it turn bitter: this, in butter made from cream that has been kept till sour, is always a mark of its tending to decay; wherefore in that case, the sooner it is used the better. The fine flavour depends on the freshness of the cream, but otherwise the butter is not the worse for some keeping. The days of market often regulate the days of churning: there is some convenience in doing a good deal of business at once, and when there is but one market near, and that but one day in the week, which in the country in many places is no uncommon thing, it will be a great convenience to the housewife if she can contrive to churn but once in the week, and to prepare all together. We shall suppose this the case, as it is a very common one, and lay down a method by which she may in summer be able to keep her cream the whole week without its growing sour, though in the common course of things it would be so in three days. We will suppose the market day Thursday: then Friday may be called with her the beginning of a new week; but as her cream will have been gathering sooner, we shall trace it from that time.

In order to prepare for the market on Thursday, she has been churning on Wednesday, and she will have taken into her churn the cream of Wednesday morning, that is, what was skimmed from the milking of Tuesday evening; the last that can go into the account of that week. The Wednesday morning's milking is set for cream, and this is the first parcel for the succeeding week: to this is to be added all that follows till the Wednesday morning again, which she is to preserve for the churn on that day. Let every succeeding skimming be mixed with this first, and on Saturday morning let her set all the cream she has got over the fire, and let it just once boil: this done let her put it back into a clean pan, and then add to it all that is taken off the milk during the following part of the week, but let her every day change the vessel in which it is kept, pouring it daily into a fresh one well cleaned and aired. It is very strange to see the effect of this, the boiled cream not only keeps good itself, but by the practice of every day putting into a fresh and perfectly clean vessel, it preserves all the rest from being sour. This has been frequently tried in the neighbourhood where I now live, and when it has been done with due care has always succeeded.



## C H A P. XIV.

*Of butter.*

**B**UTTER is the oily or fatty part of the milk, which first separates of itself in form of cream, and after that needs but little art to bring it into the condition of an elegant, solid, yet soft substance, pleasant to the taste, and fitted for many purposes. When we see butter in this light, of a thing so desirable, and so easily obtained, it appears wonderful that the knowledge of it came so late into the world; but 'tis certain that there were very many ages in which it was not known; and many countries in which it was not used in food long after the rest of the world were perfectly acquainted with it.

The Greek poets and philosophers frequently mention cheese, and yet the name of butter is not found in their writings. It is certain the only use they made of milk in those times was to drink it alone, to eat it with mixtures, or make it into cheese; for not only they are silent on the making butter, but it is evident from the whole tenour of their writings, there was no such thing in use among them. Aristotle has written largely of milk and its products, but among these there is not a word of butter; he only treats of cheese of several kinds, and the whey, of which there were also several sorts, according to the manner of making the cheese. The Romans made butter; but what is yet more strange than the former, they, though they had it, never considered it as an article of food; they used it as a medicine; and we read their sentiments concerning it in Pliny, where we find they were well acquainted with its use in other countries. It is very well known that the people of the East-Indies knew nothing of butter, till the Dutch took it over to them.

We see in this an instance of a very great truth, which is, that the most familiar things may be a long time overlooked, and that what every man wonders he did not find out himself, millions beside may have left all their days undiscovered. Butter is made from cream by the assistance only of motion: this may be given it any way, and provided it be in a proper degree, the effect will be produced. This motion in the common way of performing it is called churning; and the uncertainty of that has led the ingenious to contrive many methods of supplying the place of beating by the repeated labour of the hand; some of these are much worse than the old plain way, and there are others that really deserve the name of improvements.

There are certain particularities relating to butter, much better known than understood: it will be very well worth while



for those who have the convenience of being upon the spot, to endeavour to discover the reasons. In the mean time all we can do is to mention the facts. Suffolk butter is famous for keeping, which is a quality of so much importance, that every method is to be taken in hope of finding the cause of it. There are methods of making any butter keep longer than may at first be imagined practicable: if good butter be made up in lumps of forty pounds weight, and a little more salt be put in than is usually allowed, and they be afterwards put into a large bin of flour, they will keep the year round without damage.

Toward the end of autumn butter is apt to taste bitter. This is one of those things better known than its cause; it has been said that the reason is, that grass beginning to grow bare at that time, the cows eat the leaves that fall from the trees; but however true it may be that cows will feed in this manner, it is not true that this is the cause of the butter's being bitter: because in the fen countries, where there are no trees, and where ditches serve instead of hedges, the same thing happens at the same season. Though we cannot assign the cause of this, we can tell the housewife how to prevent the damage, which is enough for use, if not for curiosity. There needs no more than to skim the cream after a shorter time standing. We have observed before, that when milk stands too long the cream hardens on the top of it, and the butter made from such cream is bitter; this shews that too long standing alone may be a cause of bitterness in the butter, and for that reason, where there is danger of the same accident from any other cause, one would take care to prevent this from joining to make it worse; on this principle has been founded the practice of skimming milk earlier at that season of the year; and the consequence has shewn that this alone will prevent the bitterness of the butter, whatever else was the cause that would have made it so.

In Devonshire they make a kind of butter, which is called scalded butter. The advantage is not only its being particularly well tasted, but that it will keep a month without damage. The way they raise their cream for this purpose is the same the chemists use when they have a mind to give any thing a gentle heat, without burning it to the vessels, and which they call a *Balneum Mariæ*. They strain the milk into vessels, and set it by for the cream to rise. Ten hours afterwards, when the cream is risen in the common way, they set the vessel with the cream, milk and all, over some water in another vessel, so that the water reaches half way up that wherein the cream is: this done they set the vessel of water over a stove, and gently heat it till the cream is thoroughly and perfectly risen, and the  
milk



milk underneath is quite thin and blue. The gradual and soft heat does this, and at the same time doing it a great deal of service, for the article of keeping by the heat. The cream is skimmed off with a skimming dish full of holes, and the blue milk is let to run perfectly away from it. This is a kind of clouted cream: the fire so gently conveyed to it has done great service; and it may be kept with proper care several days, so that enough of it may easily be got together for churning. All that is needful for preserving it during this time, is shifting it once in four and twenty hours into a fresh and clean vessel.

C H A P. XV.

*Of churning.*

**W**E will now suppose the time arrived when convenience calls for the making the butter. We shall consider first the common way of making it with the old fashioned and long used churn. This is a vessel of wood, tall and deep, widest at the bottom and narrower to the top, where it has a cover that falls in close, and has a hole in its middle. Through this hole is let the handle of the instrument, wherewith the cream is to be beat; this consists only of that handle, and a round board, like a broad thick trencher at the bottom, in size suited to the middle of the churn. When this is put in, the handle is let through the hole of the cover, and that is then put on and fastened down. This is the whole contrivance: all that is required for making butter is well beating of the cream. And it is very well done by this instrument; for the cream being in the churn, the working of the handle up and down in the hole of the lid naturally agitates and beats the whole, and the fastening of the cover prevents its rising out. This churn is to be made clean with all possible care, by thoroughly washing and scalding, and then exposing it to the air to sweeten and purify. When every part of it is thus cleaned, it is to be brought into a proper part of the dairy, and this differs according to the season, for which reason there can be no particular fixed place for its standing.

All niceties are to be observed in churning, for it is a very precarious article; and often when all the care possible is used, the work goes on very vexatiously, and the butter will not, as they express it, of a long time, come. A moderate temperature of the air is the most favourable for the working of butter; wherefore, according to the season of the year, this must be helped by the place of the churn. In every dairy there are some places warmer and some cooler than others. In winter the churn must be set in the warmest place; and in summer it



must stand in the coolest. In the same manner the time of churning must be varied according to the weather. In the heat of summer, the air being naturally too hot for the making of butter, no hours are proper but either very early in the morning, or very late in the evening: on the other hand, as the air is too chill and cold in winter, the middle of the day, and no other time is to be taken.

The hour and the place of the churn being fixed, the housewife is to go to work. She is first to stretch a coarse, strong, and very clean cloth across the top of her churn, and into this to pour the cream. When the cream is strained and pressed through this cloth, the churn is to be covered in, and the maid is to go to work. There is great uncertainty as to the time of the butter coming, but this depends upon the manner of beating: a heavy, tedious, dull beating gives the cream time to gather again between stroke and stroke, when it was about to break; and, on the contrary, the swiftest work does the most business. Let the mistress first examine the manner of working of those who complain, she will commonly find laziness is the devil in the churn, that sets his spell upon the butter. Let her oversee the work at first, and see it is done briskly, with swift sharp strokes, and tell the people, for their own sakes, to continue it in the same manner. She will know by the sound how the work goes on. At first the noise is deep and heavy; but after a time it will begin to be shriller and sharper. This is a proof the cream begins to separate from the thinner part, or as they commonly express it, that the butter comes: the work is to be continued with the same spirit and earnestness, and the effect will soon follow. The staff will be perceived to work lighter; and soon after this, upon opening the churn, and examining the top of the lid on the inside, there will be found drops sticking to it that look yellow. The butter is now coming, and there will soon be an end of the labour, for these drops are absolute butter, and when the change is thus perfect in one part, it will not be long before it is so throughout; after a few strokes more let the churn be again opened, and there will be found butter on the sides as well as lid, and every where, so far as the splashing can reach.

The butter is now made, and is only to be got together. For this purpose the lid and inside of the churn must be scraped clean, and the butter, which is got off from them, must be put down among the rest into the body of the churn; then all is to be covered up again, and the work continued, but not with hard downright blows, but with a kind of slight rounding strokes; for all that is to be done now is to get the butter together into a lump. When this is done it is finished, and is to be taken out



of the churn. This is the general method; and these are the cautions always to be observed: but we shall now enter upon those particulars which promote or retard the formation of the butter in the churn; that the housewife being aware of what will prevent her success, may guard against it; and knowing what will forward it, may pursue it.

Over hot weather not only makes churning difficult, but the butter, when it is made, is so far influenced by the weather, unless properly guarded against, that it is whitish, brittle, and bitter; we have shewn how to avoid these accidents, by taking an early or late hour, and a cool place. The early hour is better than the late, for the air is cooler in the morning before the sun rises, than it can be in the evening, after it is set, because in one case it has been heated all the day, and in the other it has been all the night cooling: as to the place, the hotter the season the cooler that must be. I have seen very fine butter made at noonday in August, in an ice-house. Ice-houses are not in the farmer's power, but neither need he use the middle of the day for churning, a cool cellar, or the deepest and remotest place in his dairy, two hours before sunrise in a morning, will be equal in coldness to the ice-house at the middle of the day. In the coldest time of winter it is often very difficult to make the butter; and I have seen so much of this, that I think the experiment I saw tried in the ice-house could not have succeeded as it did, were it not that the cream when carried in had a great deal of heat in it from the common temper of the air, and the butter came before the extream cold of the place had any great effect upon it.

#### CHAP. XVI.

##### *Particular rules relating to churning.*

**I**N summer, as the heat of the air is the occasion of the difficulty, the housewife must take all possible means to prevent adding to the natural heat of her cream, and to cool it gradually. We have advised very brisk working of the staff in general, but here must be a kind of exception, for too much motion will occasion heat; and therefore in extream sultry times it will be better to manage the blows accordingly, making every blow smart and sure, but not repeating them so quick upon one another. There is some mystery and art in churning at any time, but it is at this season that the main difficulty occurs; and if it be not managed according to these directions, there will be a great deal of perplexity and trouble.

Let the housewife take care that she does not add to the weather, by any heat in the churn itself; and farther, let her



abate the heat when it is naturally so much that nothing can be done by cooling it. As her churn is to be scalded in order to make it perfectly clean and sweet for the use, let her take care that it be thoroughly cooled, before she puts her cream into it. Scalding water gives a great deal of heat, and wood keeps it a long time : therefore let the scalding of the churn be the first thing done in the preparation for the work, and let the churn be thoroughly examined by the hand half an hour at least before it is used, that it may be cool. Wood will retain heat when the hand does not feel it, but half an hour's cooling, after no more is perceived, will set it right. To add to this in very hot weather, it will be well to wet the outside of the churn with pump water fresh pumped, a little before the putting in the cream ; but the inside must not be wetted so near the time.

Under these cautions, there is reason to hope the butter may come without much difficulty ; but if, after a moderate time, there be no appearance of it, let a washing tub be a third part filled with fresh pumped water, and brought to the place where the maid is churning ; let the churn be placed in this, and if the water do not reach as high up the outside of it as the cream rises within, then let more be added till it does : let the work be now carefully continued, and commonly, as soon as the effect of the water is felt through the wood, the butter will begin to come. It is not only that the cream is thus brought to that condition in which the butter comes best, but the sudden change is of great assistance : the same effect that the cold air of the ice-house in the before mentioned experiment had upon the cream, the sudden chillness of the water shews in this case ; and as a considerable change is to be made in the thing itself, for the difference is really great between butter and cream, this quick shock, better than any other ways, brings it about.

These are the little particulars by which the housewife will be able to assist herself, in cases when the too great heat of the weather prevents her success ; on the contrary, when her difficulties are owing to too cold an air, she must, in the same manner, assist nature by giving a little warmth. We have advised her, in the other case, to be very careful the churn be cool from the scalding, but in this she will do well to examine the vessel how it cools by degrees, and to strain in her cream while there is yet some warmth remains in the churn. This will give a little help to the cream ; and the maid must be ordered to work it more briskly than ordinary : the coldness of the weather usually puts her in mind of this, and the less admonition is needful. If with this assistance the butter do not come,  
let



let the churn be taken into the kitchen, and placed not within the reach of the fire directly, but in the air of it, this will by degrees bring the cream to the due temper. Then the work of churning is to be continued briskly, and it will not be long before there comes good butter. There is more trouble in getting butter in very cold weather, than at any other time, but by these assistances it will be greatly alleviated; and there is nothing in all this that will be at all prejudicial to the taste or colour.

## C H A P. XVII.

*Of the washing and making up of butter.*

**T**HE butter being formed in the churn, and worked together into one large lump, is to be taken out and finished in the hands. Butter, when thus made in the churn, is far from its perfection. It is separated from the watery part in some degree, but not entirely. The whole operation depends upon this, that as in milk there was a richer part and a poorer, which being separated by standing; so in the cream there are two separate substances, an oily, which is the butter, and a watery, which is the buttermilk. The separating of these is what we call making of butter.

This separation is performed by agitating of cream in a due degree of heat, and this being done perfectly the butter is perfectly made. The churn does this but imperfectly, being a clumsy and unweildy instrument; but it makes a good beginning, and the hand is afterwards very well able to finish it. The finishing consists in two articles, the perfectly separating the buttermilk, or thin part, and the cleansing the butter from any accidental foulnesses. The lump of butter is to be taken up with both hands, and removed out of the liquor. In this there comes a consideration, which is only to be determined by the time the butter is intended to be kept: if it be made for immediate use it is to be thrown into water immediately, on taking it out of the churn, if otherwise not. Whichever be the case, let a very clean pan of earthen ware glazed, be set ready by the churn: if the butter be designed for use immediately, let this be half full of clean fresh water; if not let it be empty.

The lump of butter being lifted out of the churn must be put into this pan, and there worked thoroughly to and fro in the water, or without, labouring it with both hands, and moving it frequently about; by this means the buttermilk that remained in it will be thoroughly washed out, and the butter will be pure and of a firm and good consistence: the well working



ing, turning, and tossing the lump, is a very material article, for to that alone the butter owes its purity, its good consistence, and in a great measure its colour. I have seen butter that looked white and chalky, on taking out of the churn get a very good pale straw colour, in the frequent and repeated working in the hands among water. The buttermilk being thus separated, one of the two points intended is obtained; the other is the perfectly cleaning of it.

So much care as we have advised, one would think, would keep out dirt from the butter, but it does not always happen: a rag of the straining cloth, a hair, or some other impurity, may escape the observation; and any thing, the least imaginable in this kind, may damage the butter in the respect of sale, and will always be a blemish in the housewife's character. The working the lump in the hand may discover some foulness of this kind, which must be picked out as soon as seen; but lest any should have escaped the eye, the whole must now be taken out of the water, and cut cross and cross many times with a knife, till every part of it have had the knife in it, this will find out any little thread or hair, and thus it is to be made entirely clean.

The last thing to be done is the salting. We are not here speaking of the salting that is to prepare butter for long keeping, but just of that which is done to give it a relish. Butter is very insipid when it is made up entirely without salt, so that the freshest should always have some. The butter is to be spread out thin with the hand, in the bottom of a broad shallow dish; and then a very little salt is to be sprinkled carefully over it, the design being to mix it as equally as possible in the whole quantity; it is then to be worked up well in the hands, and it is done: it may be wrought up into rolls, lumps, or dishes, or formed in any shape more saleable at market, or most convenient in the family.

Having thus gone through the whole work of making butter, we shall proceed to the salting of it, that being a very essential part in the farmer's traffick in some places. But here, as we have named only the plain good old family way of churning, it may not be amiss to observe that there are others which have their use. The sweep is a kind of churn which works in the manner of a pump, and is used with a great deal of ease and advantage in many places: in other parts of England they prefer the barrel churn, and it also answers very well; these instruments are to be had at the turners, therefore I shall say no more of them here, as I shall not take upon me to recommend them, though I allow they are good in their kinds; the other always,  
so



so far as I have seen, very well answering its purpose. The greatest preference that is made for using these, is the quantity they can manage, and the expedition of the work; but I have seen twenty gallons of cream wrought at once in a common churn big enough to hold thirty; and this quantity brought to butter in about an hour. When the quantity is so large, a woman alone is not able to manage it, but a man and maid do it perfectly well.

In hot weather butter, though very well made, will sometimes continue too soft; and this will be a great disadvantage in respect of the carriage to market, and sometimes hurts the sale. The remedy is easy. Let the butter, when it is thoroughly made, and properly salted, be rolled into lumps, pounds, or half pounds, according to the demand, and put carefully into a basket: let a long rope be fastened to the handle of this basket, and let it be let down into a well till it come within two foot of the water. In this way let it hang all night, taking care no accident happen to it by thieves or carelessness of servants, and in the morning let it be drawn up and sent to market. The cold air that lies just above the water in the well, will have the same effect as the natural cold of winter, and it will be as hard as butter commonly is in November. With respect to the salting of fresh butter, the particular fancy, and taste, and custom of the country, are to be so far considered, that it is very difficult to establish any general rule; but in a moderate way we may say, a pint of salt will serve for twenty pounds of butter; some go as far as a pint and half for that quantity, but 'tis too much, for only the flavour of the salt is wanted, to take off the insipidity of the butter: therefore the least that will do is best; those who go much under a pint to twenty pounds do not answer their purpose, for the salt is not tasted when so little.

#### C H A P. XVIII.

##### *Of the making of butter from new milk.*

**A**MONG the improvements that have been made in husbandry of late ages, this may be very justly reckoned one, for in large concerns it shortens the trouble of a dairy very much. As we have given the rationale of butter making in the preceding chapter, there will not appear any thing strange or wonderful in the attempt, or in the success of making butter without the trouble of first setting the milk for cream. When milk stands an oily part separates, mixed with some water, this is cream, which consists of butter the oily part, and buttermilk the watery. This is afterwards beat, that by means of the motion



motion the remaining watery part may be separated from the pure and oily. This oily part, which is wanted for butter, is originally in the milk; and there is no reason to wonder that beating, which in the common way of working, drives out the watery part, and separates the oily from the cream, may in a greater degree, separate this oily part at once from the milk.

This is the principle upon which they proceeded, who first set up the scheme of new milk butter, and it answered accordingly. It is for this use that machines, and other contrivances, are to be called in to the assistance of the farmer; the quantity of milk not reduced to cream being too great for the churn; and the labour required is so much greater than is needful for cream, that no human creature could be expected to go through it. Therefore it has been properly contrived for this purpose, that the vessels shall be very large, and easily put into a violent motion; and that the work shall be performed by a horse. In some places they use an implement not unlike a common churn for this work, but it does not do near so well as those barrels that run round, with stops in them for that purpose.

The farmer who has a mind to fall into this way, may easily get the machine, the structure of it being sufficiently understood among the mechanicks in most parts of England; but he may, by fresh contrivances, save himself a great deal of labour and trouble: he may fix his milking place in such a manner, that the milk may come directly from the cows, through a pipe, into the vessel; which, when the milking is over, may be set in motion, and at once make the butter.

As we have named the benefit of this method, which is for the managing a great quantity of milk with little trouble; it will be proper we fairly set before the farmer also its inconveniences. The principal is, that the butter made this way, though very good for present use, is not found to keep so well as that made in the common method. The buttermilk made this way supplies a tolerable kind of cheese with little trouble: they let it out into other vessels, and then add runnet, and it comes to a curd very readily.

#### C H A P. XIX.

##### *Of salting of butter.*

**I**T is often necessary, and is always profitable to salt butter at certain seasons: but there are times of the year more proper than others. The butter of the early part of summer is not so proper for salting; and that of no time is so good as what is made from the middle of August to the end of October.



ber. The first difference that is to be observed in the making, is when it is taken out of the churn. We have ordered fresh butter, that is, such as is intended to be kept fresh, to be put into a pan of water, and there worked with the hands to get out the buttermilk, but in the butter intended for salting no water must be used. 'Tis to be put out of the churn into an empty pan, and there worked between the hands, to squeeze out the remainder of the watery part.

This done the butter is to be mixed with salt, which is to be worked in with the hands; the more the better: the way is to spread out the butter as in mixing that small quantity of salt with such as is intended for immediate use; but instead of that, as much as can be got in is to be added here, and when the whole is well mixed, the butter thus prepared is to be put up in pots or barrels. For large quantities barrels are needful, but for lesser pots are more proper; but they must be well glazed, otherwise the brine will eat into them. In pots it is proper to lay in a thin bed of salt before the butter is put in, and when it is put up then to lay another such bed of salt over the top of it. In many places where they barrel up large quantities, they pierce holes through with a stick, quite from the top to the bottom of the barrel, and making a very strong brine, they pour in a quantity of it over the butter, and let it run down all these holes. Some, instead of a bed of salt upon the butter when they have potted it, pour over it a quantity of strong brine, and this is no bad method.

Though the butter must not be washed when taken out of the churn, yet a great deal depends upon the getting the whey well out, which can only be done by thorough working it in the hands; and this is the more material, because otherwise it would dissolve and carry away a great part of that salt which was used in preparing it, so that it would fail.

As to the quantity of butter to be expected in proportion to the number of cows, accidents will make a great difference; but in the butter countries they generally account they may, one year with another, expect from ten cows a firkin and half of butter in a week, in summer; and a firkin in winter. The difference of feeding makes a great variation in the goodness of the butter, and none is worse than such as is made when the food is between wet and dry, as is the case in the beginning of spring and latter end of autumn, the food being at those times between grass and hay, and that irregularity having a great effect to the disadvantage of the milk.

There are two ways of making salt butter fresh, when there is occasion for it; and it is possible, by salting up the butter in  
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the cheap times, and freshening it when dearer, to make some advantage. The method for the service of a family is by beating it up with new milk; but when it is done for the market, the way is to cut it into thin slices, and put it into the churn where cream is beating for fresh butter. A good quantity may be added in this manner, but there is an art in just hitting the time. It must be put in when the other butter begins to come, otherwise it will pervert and disturb the operation; but in this manner it goes on very well with the rest, and if not too long kept, will, on being washed with the rest, pass with it as very good fresh butter, not at all debasing the price.

## C H A P. XX.

*Of whey butter.*

**W**HEY butter is little known in London, but 'tis often made in the country, for the service of farmers families. It is like other butter, but poor and rank; and is made from a cream got out of whey, as the other is from the cream of new milk. A kind of ordinary cheese is made from the buttermilk, when new milk is churned for butter instead of cream; and in the same manner a poor kind of butter is made from the whey of curds made from new milk for cheese. This depends upon the same principle, which we laid down in the account of milk. This is that there are in it three distinct substances, an oily, a curdy, and a watery part: now by whatever method any one of the two first are separated, the other will always, more or less, remain. This is the whole matter. When new milk is wrought for the butter, the curdy part is left behind, and the addition of rennet makes a kind of cheese; and when rennet is at first added to new milk, the curdy part only is separated, the oily part remaining, in some degree, in the whey; and this oily part being afterwards separated from the whey, makes the butter called whey butter. When curds have been made from new milk, the whey is to be set in large pans, in a quiet part of the dairy, for cream; there will rise a cream upon this, though not like that from new milk, and it is to be skimmed off and churned in the same manner.

In some places they enrich the butter by adding a fourth part of new milk cream; these, in any proportion, mix very well together, and the butter is the better as the more of the new milk cream is used. Beside the inferior quality of the whey butter, its quantity in proportion to the cream, is but small. The same measure of whey cream yielding but about half as much butter as the other: neither will the whey butter ever come to a good consistence, nor will it keep; so that it is  
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a very poor matter: however, it may be worth the farmer's while, in many cases, to make it.

## C H A P. XXI.

*A method of taking off the ill taste of milk.*

**H**OWEVER uncertain we remain, as to the cause of the ill taste milk has at certain times, yet the effect is constant, and is very prejudicial to the farmer; the taste being communicated to the butter, and reducing its price. To the methods we have laid down for the preventing this evil, we shall add a new and very particular one, the invention of doctor Hales, an author not more distinguished by his genius, than by the constant application of it for the publick good. We have had the method proposed by the gentleman, tried, and have found it answer so well that we shall not scruple to assure the farmer, it is not more singular than successful. The instrument is very easily made, and of small expence, and the use very familiar.

A round tin box is to be made, of six inches diameter, and two inches in depth: the lid of this box is to be pierced full of holes, they should be about a quarter of an inch distant from one another, and a twentieth of an inch in diameter. A tin nozzel is to be soldered into the middle of the lid, and to rise to some height above the surface, so as to receive securely the end of a long tin pipe, through which the air is to be conveyed into the box; through the holes of which it is to be blown up again through the milk; this tin box being placed at the bottom of the vessel. The tin pipe that goes into this nozzle is to be a little more than half an inch in diameter, and two foot or more in length, according to the depth of the vessel. To the top of this strait pipe is to be jointed and soldered on another at right angles. This should be of the same bigness with the other, but it need not be more than six inches in length. To the end of this that is free, a leather nozzle or short pipe is to be fixed, and then the whole is compleated. The cover or lid is best made deeper than the box, and scallop'd in the part that goes in; this lets the air holes have free passage, and there is to be a row of them on the upper edge, where it is not received into the box.

Every tinman will be able to make this instrument, and the most ignorant servant may be instructed to use it: the principle whereon its benefit depends is this. The ill taste of milk is so lightly mixed with it, that it may in a great part be carried off, by blowing a quantity of air in dispersed particles through it; and this may be done very conveniently by the instrument now described.

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The tin box is to be placed in the middle of a large vessel, into which the milk is to be poured as it comes from the cow. The tin pipe is to be put into the nozzle, and when this is well fixed the milk is to be poured in. Then, the box being kept firmly at the bottom, the nose of a pair of common bellows is to be put into the leather nozzle at the top, and a person is to blow for some time. The free air is thus taken in by the holes at the back of the bellows, it is forced down the pipe by the strength of the blast, and it rises through all the air holes in the box, and thus passes in so many small streams up through the milk. When the milk is but slightly ill tasted, it is thus to be poured into the vessel, as it comes from the cow, and about forty minutes blowing will perfectly sweeten it; but when it is very rank the best method is to make it scalding hot, and then pouring it in, to continue blowing till the bad taste is perfectly gone.

This method will make at any season perfectly fine butter out of ill tasted milk. In this last case a great deal of care must be taken not to burn the milk to the vessel in heating; and it should be kept warm during all the time of the blowing. The author tried it upon the milk of a cow fed with cabbage leaves for eight and forty hours; and though the milk was very ill tasted, it became perfectly sweet in ten minutes blowing. This was an experiment with only a gallon of the milk, and it was kept hot by being set in hot water during the blowing. The cream produced by this had not the least ill taste.

Some caution must be used in blowing into large quantities of milk, because of the abundance of froth. If the blowing be too violent, this will swell over the top of the vessel, therefore it is to be managed gently. The blowing must not be so brisk, but that a person standing by may break the bubbles, and keep the whole within bounds; it will take somewhat the more time the slower the blowing is performed, but the business will be done as effectually. Though the blowing may be performed more gently or more forceably, and the effect be the same in the end, the heat of the milk must be carefully observed, for otherwise, when the ill taste is considerably great no art will get it away.

The experiment Dr. Hales tried, by feeding the cow on cabbage leaves, was a very fair one for this purpose; for excepting crow garlick, which the creatures sometimes eat in the fields, there is nothing that gives the milk so lasting an ill taste. A cow's milk will be made rank by cabbage leaves a week after the time of her eating them. Crow garlick gives so strong a flavour to the milk, that no blowing will take it perfectly off when



when it is cold, though it abates it sensibly : but if the whole be kept warm for some time, and well blowed, the scent and taste will be carried entirely away.

When milk is to be blowed, it will be proper to mix a little water with it. This water should be cold in summer, if the milk be blowed cold ; and warm in winter : but if the milk be heated in order to the perfect curing it by blowing, the water should be put to it warm. It is found by experience, that the cream separates better from milk for the addition of a little water in the common way of management ; for it thins the whole, and by that means the cream more easily separates itself. In the method of blowing it answers a double purpose, it renders the whole body of the milk thinner, so that the air passes more thoroughly and freely between its parts, and the surface is less frothy. There is one very peculiar ill taste that milk has, this is a dead offensive flavour, worse than any of the rank tastes named already : it rises from the cow's drinking foul water. The farmer should, by all means, prevent it, for it not only hurts the credit of his dairy, but endangers the health of his cattle : the ill taste may be got rid of by this method.

All ill tastes in cream are first in the milk, and the best way of attempting to remove them is in the state of milk. In some places when they perceive their cream ill tasted, they heat it scalding hot, stirring it all the time it is heating, and also till it cools again : in other places they heat the milk before it is set for the cream. Both these have a good effect ; but probably the heating of the milk will be found best. With respect to curing the ill taste, by blowing, it must always be done to the milk, not the cream. The addition of water to the milk assists this operation, by thinning the body of it ; and from the same reasoning it must be more tedious, as well as more difficult, to get it out in the state of thick cream.

These are the reasonings and observations of that excellent philosopher, confirmed and extended by trials.

#### C H A P. XXII.

##### *Of the use of the barrel churn.*

THE best way of making butter with this churn is out of cream got in the usual way. This is to be strained into the barrel churn, and the advantage is, that turning upon a spindle the motion of this churn, if well managed, is more regular : but at the same time there requires a great deal more skill in the use of it. The greatest mistake made with this churn, is the turning it about too quick. I have seen butter



made and unmade again many times over, by working it in this manner.

The rule is, that the turning be gentle, slow, and steady; for this soft motion on the spindle is equal to a very sharp beating in the downright way. When this turning is done in the right manner, the butter comes quick, and very fine. It is hard, sweet tasted, and will keep; whereas the single article of too violent turning, will make the same cream yield a soft, bitter butter, that will not keep. This gentle motion must be kept up without interruption, from the first turn till the butter comes, for all goes backward upon stopping. When the motion has been too brisk, and the butter is near made, I have seen, that on stopping a minute only, the cream and butter-milk have mixed again almost as entirely as before, and the whole work was to have been done over again.

The housewife is to see the barrel churn turned constantly, till the butter comes: she needs not to open it to examine into this, for she will know by the sound: there is a particular squashing noise in the churn when the butter is come, quite different from what the cream made before: then she is not to order the servant to stop, but only to turn more softly and gently. This serves to finish the separation of the buttery parts, and to bring them together into a lump: this must be continued half an hour, and by that time all will be perfectly done.

The butter is then to be taken out of the churn, and well worked with the hand; and the salt mixed with it according to the intention of spending it fresh, or keeping. In salting of butter, it is a good method to have the salt beat to powder: some have used basket salt, because of its fineness, but it is dear and has little taste, in comparison of the other. Every housewife knows how to powder common salt, by first drying it, and this is the best for the use of butter. In churning by the barrel churn, the same cautions are to be used as in the other way, respecting the season of the year and condition of the vessels. The churn must be kept as carefully clean as the other: in summer it must be well cooled from the scalding, and in winter it should be left warm.

### C H A P. XXIII.

#### *Of cheese.*

**C**HEESE is made of the curdy part of milk, as butter of the oily; and according to the condition of the milk, it becomes of various kinds and prices. All cheese is the curdy part of milk, separated from the whey: but in some kinds it is only



only the curdy part, without the buttery; and in others it is the whole mixed together, only the whey being separated: there are also some kinds of cheese that have different proportions in this mixture. In general, as it is the curdy part of milk that gives the consistence and form to cheese, so it is the creamy or buttery part mixed therewith, that gives it the mellowness and richness. The farmer's servants well know what cheese that is which is made of new milk whey, whence all the butter has been taken; and the cheese of Parma, and other of the Italian dairies, shews us how excellent a production it may be when the whole of a rich cream is mixed among the curdy part in the working.

We have some counties in England remarkable for good cheese, and others for bad: this has by some been laid entirely upon natural faults, as the soil and grass; but it is in a greater measure owing to the different conduct in the dairies. A good housewife will make good cheese any where. We do not mean that the milk produced by the worst food, will yield as good cheese as the best, but when the food is the sweetest, a bad manager may make bad cheese; and one who understands how to make the best of indifferent advantages, will make good cheese upon poor land. Two ways cheese is spoiled by pasturage: when the food is so poor that it impoverishes the milk, and when weeds grow in abundance, which give it an ill flavour, the principal are melilot and garlick. The remedy is easy, for they may be pulled up: as to the other there is no way of mending it, unless the farmer have better pastures, into which he can put them; if not he must be content with indifferent cheese.

It will then be the consideration, whether he shall engage in cheese at all: and this he must learn by trial of the milk, to the two different purposes of butter and cheese. There are pastures that yield a milk fit for butter, but not cheese, and others that yield such as is excellent for cheese, but unfit for butter. When the farmer sets himself down upon his land, he is to consider first, which is the most profitable manner of employing his dairy: if the pasturage be equally proper for either, let him turn his thoughts to the making that which is most marketable; but if it will only serve well for one, let him take that: cheese and butter are things for which there will always be a demand.

Let him examine what is the cause if his cheese be bad, and remedy it by degrees. The first thing is to get the worst weeds out of his pastures; and then let him set about the work of amending his land. A little expence will go a great way in



the improvement of pasture grounds : and he will every day receive the fruits of his expence.

## C H A P. XXIV.

*Of rennet or the rennet bag.*

**C**HEESE is the curdy part of milk separated from the watery matter : milk will curdle with any acid ; this curdling is the separation or the gathering together of the curdy or cheesy part separate from the whey. As any acid will answer, the farmer has his choice of a great variety, but finding nothing agree so well with the milk as rennet, that is the only one he uses. This is a natural preference, for most of the other acids or sour liquors are either of mineral or vegetable origin : now rennet being an animal acid, naturally agrees better with an animal fluid, such as milk.

There is in the stomachs of all animals an acid or sour juice : nature has given this to assist in the digestion of their food. Of all these acids there is none so gentle and so certain as that of a sucking calf. This therefore is what the farmer prefers, and is what he calls his rennet or rennet bag. That he may always have it in perfection, we shall tell him what is its proper condition. The rennet bag is the stomach bag of a sucking calf, that never tasted any food but milk, and where the curd lies undigested.

In spring let the farmer recollect the occasion he shall have for these bags, and get himself a sufficient store of them. And he must order and prepare them in this manner. First let him open the bag, and pour out the curd and thick substance into a bason, leaving the rest that is not curdled in the bag. Let the curd be carefully examined and picked clean. There may be specks of dirt, hair, or other foulnesses among it ; these must be all taken out, and the curd is then to be washed in cold water several times. By this means it will become perfectly clean and white. When thus cleaned it must be laid on a cloth to drain, and then put into a clean dish ; in this it is to be sprinkled well over with salt, using a handful or more to this purpose, and with the hand rubbing well in the salt to every part of the curd. When the curd is in this condition, let it be covered from dust, and let the bag be cleaned. This is to be done by washing it several times over in cold water. When it is perfectly clean let it be rubbed well with salt, and then put in the curd, which has been so well cleaned, with the salt among it. Finally, let the outside of the bag be also well rubbed over with salt.

When a sufficient number are thus got ready, let them be  
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all laid together in a pot, and the pot tied down carefully. The whole work is done, except what is to be the effect of time. These bags will keep without any danger of spoiling, and they are in their full perfection a year after. Though the rennet is best after a year's keeping, it may be used fresh. The curd gets its right condition from the very time of its being separated by the rennet; and a fault then is not to be remedied afterwards. When the rennet is fresh, the curd is not made so firm and strong; and the cheese never gets a good consistence; therefore it is better the farmer purchase such as are of a right age, than use his own too soon. The old way of managing the rennet bag was, after a very slight cleaning, to hang it up in a chimney; but that is by no means so good a way as the salting and potting a number of them together: it is neither so cleanly, nor does it keep the rennet in the needful degree of strength.

We have shewn the way of preserving the rennet bag, but there remains an article worthy strict notice and attention; that is the seasoning of it. When the bags have been kept a year, let one of them be taken out of the pot and opened. Let the curd be emptied out into a clean marble mortar, rub and grind it well by itself first; and then add to it the yolks of three new laid eggs, and half a pint of fine rich and perfectly sweet cream; rub and grind these together, and when they are well mixed, dry before the fire one blade of mace, one clove, and about eight grains of saffron: when these are so dry that they will rub to pieces, powder them in a small mortar, and throw the powder to the other ingredients; then work all well together again, till it is perfectly mixed, then let it be put up in the bag again. Make a very strong brine of salt and water, by boiling them together; let this stand to settle, and strain off the liquor into a clean earthen pan. Take about half a gill of the curd out of the bag, and mix it with this brine. This done close up the bag again, and hang it up with the brine, putting in four or five walnut leaves.

The rennet being thus prepared, is to be set by for a fortnight, and will then be perfectly fit for use. We have here set down at large the management of one bag; and according to this the farmer must dress all the rest. His care must be to do them one after another, in such time as he shall want them; so that he may always have one under another, and may never be obliged to use any one that is not duly prepared, and that is not a full fortnight old in the brine. Some use less care in the preparing their rennet, but it is sparing trouble in a very wrong article; for not only the rennet is



sharper, and goes farther this way, but the goodness of the cheese depends upon it. Some use more care and caution: thus it is not unusual to add more articles in the seasoning: and others boil a handful of white saxifrage, or some other herb, in the brine: there is little harm in these things, but they are needless. We are for delivering fully every necessary article, and we caution the farmer strictly and exactly to observe them all; but we would not load him with unnecessary trouble.

## C H A P. XXV.

*Of new milk cheese.*

**N**EW milk cheese, called morning milk cheese, is a general production of the dairy, like fresh butter. But it must differ according to the variation of pasture: this, though it encreases or debases its value, makes no alteration in the manner of preparing it. In the morning, toward the time of the people's coming in with their milk, let a clean and large tub be set ready; and let the milk brought in the evening before, be very carefully skimmed. Let the new milk, warm from the cows, be strained into this tub, and pour through the strainer the cream taken from the last evening's milk. Some hot water is then to be poured in, in such a quantity as will serve to make the whole tolerably warm, which scalds the cream.

When this is done it must be moved about with a dish, till it is no more than luke warm. It will then be in a condition to receive the rennet. The proportion of rennet differs according to the strength, but a spoonful when good is a very good proportion for three gallons of milk; so that if the quantity be one and twenty gallons, the farmer will know he is to put in seven spoonfuls of rennet. He must draw this steadily and evenly out, without stirring the bag; and very carefully strain it into the milk: for if the least particle of the curd of the rennet fall into the milk, it will be unseen among the curd it brings on in the whole, and then mixing up with the rest in the making of the cheese it will taint and corrupt. When the rennet is put in, the vessel is to be covered, and stand quiet half an hour. The cover is then to be taken off, and if the proper separation be not made, it is not to be left longer, but more rennet is to be put in. Beside the difference of rennet, there is a great variety in milk, some requiring more of the same strength than other. The vessel is to be covered up as before; and opened at times to see the effect. As soon as the separation is well made, the curd must be well tossed and worked about in the whey. The best method is first with a shallow bowl, and afterwards with the hands.

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The curd being got to the bottom, the whey is to be skimmed off with a shallow dish; and the cheese fat is then to be got ready to receive the curd. The curd is to be lifted up with the hands and broke, and pressed down into the fat. When the fat is well filled, the cheese board is to be laid over it, and a small weight put upon it. It is to be left thus till all the remainder of the whey is pressed from it. When it has done dropping, let the housewife wet a large cheese cloth, and lay it over the board, and then turn the cheese upon it. Then she is to lay the cloth into the fat, and put the cheese in again. She is now, with a thin slice, to press down the sides every where: then turning the cloth over it, it is to be carried to the press, and there pressed with a large weight. It is to lie in its present condition half an hour in the press; after which it is to be turned into a dry cloth, and then put there again.

This practice is to be repeated every two hours; each time using a fresh dry cloth; and it is to continue in the press till the evening of the next day: only the last time it is turned, it is to be put into the fat without any cloth. When it is after this taken out of the press, it must be put into a tub, and rubbed on both sides with salt. There it is to remain all night; and next morning it is to be rubbed again with salt, first on one side and then on the other, and left upon the brine which came from the first and the succeeding saltings. When it has lain thus three days it is to be taken out, and laid on a shelf to dry; and while it is drying the housewife must continue her care, wiping it once every day perfectly clean with a dry cloth, and then turn it on the dry side. At first it is fit the cheese dry somewhat quicker than afterwards, which may easily be contrived by changing the place.

## C H A P. XXVI.

*Of a one meal cheese.*

**W**E mean, by a one meal cheese, such as is made of the milking of one morning or one evening only; but the morning is the best time, because the day is then before him for the business. The method of making this is the same with that before described, only that it is not so difficult in the first part, because there is no trouble in mixing the cream, and preparing the whole for the rennet. The housewife should give her milk people a caution to be quick home with their pails; for the most advantageous way is, to mix in the rennet when the milk is warm from the cow: it is to be strained into a tub, and the rennet at once put to it, in the quantity before-mentioned. If the milk be not warm it must be set over the fire to



give it a little airing: but a great deal of caution is to be used, for a little heat serves to make the rennet take effect, and the curd separates the sooner for it; but if the milk be made too hot another separation comes on, which is not intended in this case, and this is the parting of the cream. The effect of heating milk is always a raising of the cream more freely and speedily: this is not intended in milk designed for cheese, for we see a great deal of cream is added to the milk in the former method of making the new milk cheese.

When the rennet is in, 'tis to be covered up till the curd is formed; and then the cheese is to be made as that before described.

The two meal cheese is a cheese made of two milkings mixed together, and the common way is to mix the evening's and the next morning milk for this purpose. The cream is stirred into the evening's milk, and the whole is mixed with the morning's: all this is warmed a little together, and the rennet is put to it, it is then to be covered up, and the whole to be managed into a cheese as before.

There is another sort of two meal cheese, which is made by mixing the evening's milk after it has been skimmed, with the morning's entire, and this also is easily enough made into a cheese, by first warming the whole over a fire.

These cheeses differ in goodness according to the quantity of cream that is in them, and they are all inferior to the new milk cheese described in the preceding chapter. As that consisted of the morning's milk and evening's cream, it is the richest cheese of this kind. As to the others, the one meal cheese and the two meal, are just equal in goodness, when the evening milk is used with its cream; but in this case the cheese is one degree inferior to the other, as there the cream of the evening went to enrich the milk of the morning, without its own milk. The third and poorest kind is that made of the two meals or milkings, one of which has been skimmed. This reduces it toward the condition of skim'd milk cheese; but however it is very superior to what is made of skim'd milk only, because as that consists of the curd of milk wholly, that had lost its cream, this is in part composed of curd with the cream in the milk, that of one meal not having been skim'd. We shall add, for the use of the poorer farmer, and such as have occasion for the most ordinary cheese of all, the manner of making it from milk that has been skim'd entirely.



## C H A P. XXVII.

*Of skim milk cheese.*

**T**HIS is to be made with some care; and the ingredient is so poor, that without more caution than is needful when there are better materials, there will be no making it. When the milk of two or more meals has been skim'd for butter, it must be poured into a tub; and then the first thing is to taste it carefully, to find whether it begin to be sour, for on this depends the manner of working it; if the housewife cannot perceive any thing sour in it, she must put a part of it into a pot, and set it over the fire, making it so hot that it shall be able to heat the rest thoroughly.

In the other cases a richer milk was used, so that there was danger of raising and separating the cream by too much heat; but here there is so little that it is in less danger of that accident; and the milk being poorer, is not so easily turned. It will require somewhat more rennet and more heat for that purpose. This is the method to be followed, if the milk be sweet; but if it be sour, or inclined to sourness, it must not be set on the fire, lest it should break: in this case a small quantity of water is to be made thoroughly hot, and poured in to bring the whole to a due degree of warmth to receive the rennet. When the rennet is in, the vessel is to be covered, and after this, the cheese is to be made in the same manner as the former.

## C H A P. XXVIII.

*Of Cheshire cheese.*

**T**HE pasturage in Cheshire is favourable for cheese; some soils are more, some less favourable, but none so much, at least none more than this. To this article, which they have from nature, the Cheshire people add a particular care in the making up of their cheeses: otherwise there is not much particular in the method, except what becomes needful from the great size. Cheshire cheese is a new milk cheese of a very large size. The way in which they make it we shall deliver presently; but first, we shall give their general management of their cattle.

They make their fine cheese from the beginning of May to the end of September. In the middle of April they turn their milch cattle out to grass: they make cheeses as soon as they begin this feeding, but the first are not the fine kinds, nor are brought to market. They are coarse, poor, and ill-tasted, and are all consumed upon the spot. The pastures are too rank at  
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this



this shooting season, and the cheeses partake of this rankness. Far from being of that regular and firm texture, the cheeses made afterwards have, these lose their shape, swell and become full of holes, so that they are neither well tasted nor well looking. Nothing can be so unlike what we commonly understand by the name of a Cheshire cheese, as what is made in Cheshire at this time of the year. Till the pasture is come down from its own rankness, it does not afford milk fit for cheese making. They use particular cautions at that season: they always boil a part of their milk, which they do not at other times of the year; but this does not answer their purpose. However, as they are used to cheese making they begin then; and so long as it is bad they keep it for their own use.

Some have attributed this fault in cheese made early in the year in Cheshire, to particular weeds; the horsemint has been named as the principal; but this is a palpable error. Horsemint grows all the summer; so that were it the cause the effect would remain. The occasion is the particular condition of the common pasturage: this in the rest of the year favours the cheese, but it is then too rank. We have named the time of the year at which the fine cheese is made, which lasts only five months; after this, though the same care and pains be used, the cheese grows bad again: but they continue making it for some time, for the use of their own people.

The fault of the cheese after Michaelmas, is different from that in spring. In April it is rank, and in October it is poor. This is the greatest proof that can be, not only that the excellence of the cheese is owing to the nature of the pastures, but that this article of food to the cattle is the whole matter on which the difference that good dairywomen find in cheese depends. There is good cheese made in Suffolk, and we see there is bad in Cheshire: but in general it is reasonable to conclude, that the soil of Cheshire affords a pasturage particularly fit, and that of Suffolk unfit for cheese. We see the growth of pasturage in Cheshire, marked by the condition of their cheese. During summer, when that food is in its regular and perfect richness, cheeses made there, excel those of any other part of England; but in spring the herbage is too rank, and they are destroyed by their own richness; and in autumn it is too weak, and the cheeses grow poor.

As the people of Cheshire begin cheese making before the pasturage comes to be good, they continue it after it is decayed; and this with very good reason, for they could not any way else tell exactly when to begin, or just when to leave off. By this conduct they do not lose a day of the cheese season; and



and what they make before and after they use at home. After this they go to making of butter, a great deal of which they salt, and this they continue till the cows grow dry. After this account of the Cheshire cheese, we shall give the directions for attempting it in other places, according to the rules which are followed there; for in all the country they have but one and the same practice, and they very seldom fail during the favourable time of the year.

## C H A P. XXIX.

*The way in which Cheshire cheese is made.*

**T**H E R E are people in Cheshire who make poorer cheeses than others. The difference we observe in them, though in some degree owing to the keeping, is also sometimes owing to the condition in which they come from the maker. The Cheshire cheese is properly a new milk cheese. Some make these with new milk, enriched by the cream of the last milking, and others of new milk, impoverished by an addition of the skim'd milk of a preceding meal. In Cheshire their pastures are so rich, that they never find it needful to enrich their new milk, for it will alone make cheese of the richest kind that can be; but some of the Cheshire people impoverish their new milk, by mixing the skimmed milk of a former meal, and this always debases the nature and quality of the product.

They are particular as to the condition of the cow: and this is a caution all farmers would do well to take from them: they find by experience, that the milk of a cow which has just calved, is not so proper as that a few days after; therefore they never take the milk of any cow for cheese till she has been milked four or five times. They use their whole store of new milk, a very little excepted, in the cheese manufacture. When the morning's milking is brought in, they strain it warm into a large tub, and put in their rennet. About four spoonfuls is the quantity they allow to as much milk as will afford a cheese of a hundred weight; and there are dairies of such consequence in that county, that they turn out two cheeses of about this size every day, during the five months they are in the right season. They cover up the tub, and when it has stood half an hour they open it, and find the curd formed. They are very cautious to hit the right quantity of rennet, which no rule can determine, because of the difference in the strength: for too little does not give the curd a due consistence, and too much makes the cheese bitter. After half an hour they uncover the tub, and press down the curd with a large skimming dish; and when they have pretty well cleared off the whey, they work  
the



the curd with their hands, they break it to pieces in the most perfect manner, working it a long time.

This done, supposing it for a hundred weight cheese, they add one pound of salt: this they mix thoroughly well with the curd. Then they put the curd into a wet strong and large cheese-cloth, and when they have got the whey tolerably well drained out, they put it into the fat, or mould, for four hours, with a good pressure, putting the fat in the cheese press, and working it down pretty strongly.

At the end of four hours they take it out, salt the outside, put it into a fresh wet cloth, and put it into the fat, and that into the press again: here it is to be kept four hours more; and in the mean time a quantity of good strong brine is to be made of salt and water; and put into a large tub.

When the cheese has been four hours in the press they take it out, and put it into the tub of brine, and there let it lie eight days, all the time covered over with brine, and turned once a day. At the end of this time it is to be taken out, and laid to harden and dry. A quantity of rushes are to be cut up, and laid green on a large board: on these the cheese is to be laid when taken out of the brine, and for the first day nothing is done to it; the next morning it is to be turned and wiped with a hair cloth all over; and this is to be repeated every day for twenty days.

At the end of this time it must be removed from the bed of rushes, and laid on the floor; and it is here to be taken up, and turned once in three days, and at every turning is to be rubbed; till it gets firm and hard: as this is the compleating the work, it is to be managed very carefully; for if the due degree of hardness be not given at this time, the cheese will be liable to accidents in keeping.

When finished and hardned, the last thing is the rubbing it over with some butter: half a pound of butter is proper for a cheese of a hundred weight, and this should be rubbed thoroughly in all over it, nothing more tending to preserve the rind in good condition, and keep the cheese sound.

This is the method in that famous cheese county. They have rooms built on purpose for the drying of their large cheeses, and they raise the floors several feet above the ground, to preserve them from damp. In many places they use shelves put round these rooms, instead of the floor, which I think the better method, for the cheeses are more out of the reach of damp, and they are more easily turned, and more conveniently rubbed and wiped.



## CHAP. XXX.

*Of making cheese like Cheshire, in other places.*

**W**HAT I have written on the making of Cheshire cheese, is what I collected from those who are much concerned in that product, and from what I have myself seen on the spot: for I once made a journey thither, and took notes of every circumstance, intending to attempt the making a cheese of the same sort at home.

I set about it soon after, employing careful servants, and over-looking every thing myself. The first trial did not succeed; and I made another; after the second I made a third, and being very much bent upon the thing, I repeated the experiment oftener than a wise man should have done: for I found in the end I had been trying to make brick without straw, my materials not serving me.

I was not at that time so sensible as I am since made by experience, that the Cheshire manufacture depends, in a manner, entirely upon the Cheshire pastures. On the failure of the milk from one pasture I tried that of another, and went the round of all my own, and several of my neighbours, but nothing would do. Some was too rank, and some too poor, but none came up to that excellent richness of the Cheshire kind.

This I have mentioned as a caution to others: but there is no need it should prevent their making trials, only let them learn from this experience, not to venture so many. There may be other grounds that will afford a proper milk; but from such as do not, none can ever make this right kind of cheese.

Wherever the farmer has upon his hands a rich, short, and sweet grass, with numerous blades, a full body, and few rank weeds, it will be worth while to make a trial; not to set aside the whole business of his dairy for it, but to make one cheese. Let him give the experiment fair play, by making it in the first or second week in June, which is the time when the very best cheeses are made in Cheshire; and having made this trial with care, if it do not succeed let him give up the expectation: if it do, he has the opportunity of making a fortune. The misfortune of these cheeses made in the Cheshire manner in other places, is that they will not keep their consistence; and when that is lost they soon decay. The great happiness of the Cheshire pastures is, that they furnish a milk which has at the same time great richness and firmness in the curd, which are the two articles whereon the firmness and fineness of cheese depend.



## C H A P. XXXI.

*Of making sheeps milk cheese.*

**T**HE reader who is unacquainted with these subjects, may suppose a cheese made of sheeps milk must be a very poor one: but this is a great error. They prefer in Cheshire the cheese of the neighbouring parts of Wales, to the finest of their own, giving thirty per cent. more for it, and this is all made of the milk of sheep.

Sheeps milk abounds in curd; all milk consists of the three parts, curd, butter, and whey; but the sheeps milk affords most curd in proportion of any kind. It is natural to this curd to be tender; but there are pastures on which the sheep yield a milk as proper for cheese, as the cows of Cheshire. These are principally in and about the borders of Wales.

Denbighshire is the particular county where sheep milk cheese is fine: this is as famous as the Cheshire of England. The pastures are hilly, the soil rocky, and the grass low, but very thick, and entirely free from rank weeds.

We have nearly the same pasture in some parts of Hertfordshire: the farmer will know it by the shortness and dark look of the grass, and by the little blue bell flowers, which are the principal weed that grows among it. In these pastures sheep yield a milk, the curd whereof is firm, and therefore there is all the advantage, and little of the inconvenience attending this species. Cheeses made of this milk are extreamly rich and mellow. They never have any great degree of hardness; but their richness is always a recommendation, and another is their ripening very quick; for one of a moderate size will be fit to eat in four months.

This may very well tempt the farmer to make a trial, and the price may encourage him farther. 'Tis a cheese that in many parts of England brings from five pence to seven pence a pound retail; and might be set at a much higher rate in London,

Five ewes, upon a good pasture, will give two gallons of milk a day: upon an indifferent one they will give a gallon and half: upon this the farmer may judge how many he will set aside for this purpose of milking. He may count five ewes as the same with one cow, and he will not be much mistaken. The sheep are to be milked morning and evening, and when they are a little used to it will stand very quietly. The milk of the evening is to be strained into that of the morning, and when the milkers come in the next morning the whole is to be mixed with what they bring in. This is the custom in Wales,  
where



where they make these cheeses best ; so that the sheep milk kind is always what we call a three meal cheese.

When the milk is mixed, a little of it must be heated, and that poured into the rest to make the whole of the same degree of warmth with that which just comes from the cow. Then the rennet is to be strained in, and thoroughly mixed with it. As to the quantity, it is to be about one fifth part more than is used for cows milk. The vessel is to be covered, and stand quiet till the curd is formed, and after that the procedure is to be much the same with that on other occasions. The whey must be skimmed off, the curd must be well worked in the hands ; and afterwards put into a wet cloth and press'd, but this pressure must be continued six hours. At the end of that time it must be taken out, and the cloth shifted ; the outside must be then salted, and it must be pressed six hours more, the other side being turned upwards.

While this is doing, a bed of rushes must be made upon the floor, and the cheese, when taken out, must be laid upon it : and in this manner it must lie a fortnight, taking up and turning it every day ; and every time it is taken up, rubbing it softly but thoroughly all over, with a dry and not very coarse cloth. In this time, drying gently and leisurely, it will get some considerable firmness, for a cheese of so mellow a kind. When it is thus far prepared, it is to be taken from the floor and laid upon shelves, where it will dry more quickly than at first, and be thoroughly finished. There may be a cheese made with sheep and cows milk mixed, which will answer the farmer's purpose in many places, where his pasture would not serve for the making cheese from the sheeps milk alone.

There is a season when the sheeps milk may be had in plenty, and without inconvenience : this is when the grass lambs are sold off fat : the ewes will then yield a large quantity of milk, and that regularly for some considerable time ; they should therefore be milked, and the produce mixed with the cow's milk for cheese. We have mentioned how sheeps milk abounds with curd ; and how fine that is in its kind : being mixed with cows milk, the curd produced from both has the advantage of each kind, it gets firmness from the cow, and a delicate mellowness from the sheep.

This curd is to be made into cheese in the way we have described for the new milk cheese, and it will excel any that is made of new milk from the cow alone. I have had cheese of this kind made upon my own ground, and when it has come to my table, some have taken it for one kind of foreign cheese, some for another ; and every impartial person has declared it better than most kinds.



## C H A P. XXXII.

*To make a nettle cheese.*

**A** Nettle cheese is a very thin new milk cheese, with an exceeding fine and smooth coat. It differs from the common new milk cheeses more in the form, and the manner of drying, than in any thing essential.

For the drying of Cheshire cheeses, which are large and thick, they use a bed of rushes spread evenly upon the floor of the room: in the same manner a bed of common nettles is the matter on which these cheeses are dried, and from which they receive their name; the nettles upon this occasion are to be fresh cut; and the manner of making cheese is this: let the milk of the morning's milking be taken as it comes in warm from the cows, without any addition. Let this be strained into a large pan, and let there be immediately added as much rennet as will turn it. 'Tis then to be covered up half an hour; then the curd is to be press'd down, and the whey skim'd off, and when thus separated the curd is to be wrought in the hands. When it is well worked it is to be put into a cheese fat, not more than three quarters of an inch deep, and press'd to get out the whey.

The same method is to be used that was directed for the new milk cheese, and by this means there will be a very fine one meal cheese, thin and delicate, prepared, and ready for drying. When it has been sufficiently press'd it is to be laid on the floor, which is to be first spread over with fresh nettles, and another parcel of the same is to be spread over it. Care must be taken in the cutting and laying these nettles, for the cheese is to have an even coat, and that will depend upon the management in this particular. Only young nettles are to be taken, or the tender tops of such as are more grown; and these, when they have been laid evenly upon the floor, must be press'd down, and flatted into an even and smooth surface: this is the essential article whereon the smoothness of the coat of the cheese depends; and if there be any thicker stalks, they will take effect upon the tender surface of it, and even a rumpled leaf will have the same consequence. When the bed is made flat and even, the cheese is to be laid carefully upon it, and a coat of the same kind spread over it. Every other day fresh nettles are to be brought, and the cheese is to be wiped and laid upon the new parcel, covering it with fresh ones. In this manner it is to be kept till it is ready for the table, and no cheese ripens finer.

C H A P.



## C H A P. XXXIII.

*To make a running cheese.*

**T**HIS is a richer cheese, with the same advantages of ripening : it is made thus. Mix equal measure of stroakings of the cow, and rich cream, put this in a clean pan. Set it in a pot of water, that the water may reach up on the outside as high as the cream and stroakings within ; then set the pot on the fire, till the whole be as warm as milk from the cow. Take the pan out of the water, and put in as much rennet as will turn it. Stir this, and cover the vessel.

When it is come, press down the curd, and take off the whey : then heat the whey scalding hot and throw it upon the curds, and after this take up the curd, which will now be in a body : this must be done carefully with both hands. The curd is to be raised up as whole as possible, and laid into the fat ; then place it in the press, and put a small weight upon it ; afterwards put on a larger, but it is too delicate for that forcible squeezing. When the whey is got out let it be taken out, salted a little, and laid upon a fine even bed of leaves of nettles stripped from their stalks. It must be shifted as the other, and will be ripe in three weeks or less.

## C H A P. XXXIV.

*Somersetshire cheese.*

**T**HIS is a large rich cheese, named from the county where it is made. The bigness is a material article, for I have seen the same kind of cheese made smaller, and it has been not at all particular, or scarce seemed of the nature of the larger. What is farther singular is, that there is butter worked into it, which helps the mellowness.

Let the milk of twelve cows be set over night for cream ; and in the morning let the milk of the same cows be brought in warm. Let the cream be taken from the over-night's milk, and mix'd with this, let all be strained together into a large tub, and as much rennet put in as will turn it. Let it be covered up half an hour, then open it, break and press down the curd ; separate the whey, and when the curd has been well worked in the hands, add three pounds of fresh butter. This must be worked into the curd, and a little salt sprinkled over it. It is then to be put into the press in a large wet cloth, and turned frequently, every time using fresh wet linnen, till toward the last, and then there must be three or four dry cloths. When it is put in for the last time it must be firmer pressed, and it ought to remain in the press forty hours. When it is taken out of



the press it must be washed over with whey, and laid in cloths till dried. It is finally to be laid on a shelf, that it may dry perfectly, and there must be turned very frequently, and every time carefully wiped.

## C H A P. XXXV.

*Of the early use of wool in the eastern countries.*

**W**OOL has been considered at all times as a valuable commodity; and that of our country is preferable to most other. We find the use of wool known in the earliest periods, and flocks of sheep are mentioned in the first ages of mankind. Kings have not been ashamed to employ themselves in the care of them; and therefore the country gentleman needs not think their wool an article beneath his regard.

The patriarch Abraham had flocks, and the Israelites of that early time employed themselves in the care of them: their neighbours the Midianites had such numbers, that the Israelites took among the spoil more than six hundred thousand; and two hundred and fifty thousand were taken from the Hagarites by the sons of Reuben.

The Ethiopians had sheep; for when Asa conquered a part of their country, he carried them away in abundance: the Arabians at the same period had also sheep, for they brought more than seven thousand rams at one time to Jehosaphat; and the Moabites must have bred them in great quantity, for Mesha, king of that country, rendered to the king of Israel a hundred thousand lambs, and a hundred thousand rams. These are passages of history delivered in the old testament, and by these we find that at this remote time, the Israelites had sheep in great abundance, and that the Midianites and Hagarites, the Æthiopians and the Arabians, and the Moabites fed them also in vast number.

Here is an account of sheep bred in a manner all over the eastern quarter of the world; and we have occasional mention of the same creatures making a chief object of the care, and a principal article in the riches of the Amalekites, the Philistines, and the people of Damascus. We see a great part of the quarter of the world, then most inhabited, devoted to the care of this useful animal. This creature was not bred only for its flesh: the mention of wool is made in some of these passages; and in others there are allusions to the implements of weaving, and of the methods of preparing wool for the loom. That the Israelites fed sheep for the wool, may be seen by the tythe exacted on it. The first of the fleece is declared the due of the priest: and that other countries knew its value in the same manner, is plain from an instance in the present of the Moabitish king before-named, which is, that the rams were given with their wool. The staff of Goliath's spear is said to equal a weaver's beam: the fullers field is mentioned in Isaiah, and by the prophet Malachi; and Ezekiel, in the twenty-seventh chapter, calls the people of Damascus merchants in white wool.

These



These passages are the summary of what is said concerning flocks of sheep, their wool and its manufacture, in the scriptures; and they shew that the sheering of sheep, the use of wool, the manufacturing it into cloth, and the preparing that cloth by fulling, were articles known in the earliest time. It establishes the care of this animal, and the use of its fleece, upon a very great authority of antient history: it produces examples that may animate private gentlemen to interest themselves in the care and management of its fleece, and kings and legislative powers to establish and encourage the manufacture of it. This attention both of private persons of fortune, and of the publick authority and regard, is greatly wanting at present in England, for the advancement of our woollen manufactures.

It has been said that Great Britain and Ireland were the resources of the rest of the world for wool; but this is a mistake. Wool was produced in abundance, and wrought into cloth for common service in the whole eastern part of the world, before any thing was known of Britain; and of late time, there are many other countries in Europe which may rival us, if we neglect the care, or our legislature the encouragement.

It is misleading the husbandman, to make him imagine the natural quality of British wool is so superior to that of other countries, that he may manage as he pleases, and it will still have the preference. Other nations have been eminent in this article before Britain was attentive to it. We know not whether this island was peopled at the time of the earliest of the transactions, in which wool is mentioned; and long after, when the enterprising genius of the Phœnicians pushed their navigation and their traffick hither, this commodity was not known amongst our people. They traded hither for tin, which they purchased on the Scilly islands in Cornwall, then called the Cassiterides; and as they came hither on that account, they took of those early Britons also all that they had to offer in commerce. The several articles were named, and wool is not of the number. Strabo has committed to posterity the different commodities: they were beside tin, lead, corn, cattle, gold and silver, also dogs of a particular breed, the old and famous English bull dogs; and hides. These were the articles furnished by the Britons, and they had a market for whatever was the produce or manufacture of their country, but they never brought wool to the traders, though they sold them hides. Therefore we see Britain, far from having at all times supplied other nations with wool, was a country that late fell into that concern; and that there were manufactures of woollen in the eastern countries, and probably in many others, before the use of the fleece appears to have been known here. The inhabitants of a great part of this kingdom went naked, and those who covered themselves used the skins of beasts, in a rough and savage manner.

As we have shewn from sacred history, that this was the case, we shall shew it appears also in the same light from other authorities; and from thence we shall deduce the lesson of industry, care, and application to the affair of wool, from the meanest farmer to the sovereign.



It appears that other nations were acquainted with this valuable commodity before it was known in Britain: they may therefore supplant us in all places, as they have in many, in this article. Our husbandman has it in his power to raise his woollen manufactures, to a greater perfection than other nations: this is the advantage, let us not suppose we have more than we have, but knowing the true state and limits of our pretensions, let us use every method to improve them.

## C H A P. XXXVI.

*Of the early use of wool in other countries, according to general history.*

**A**LL old historians mention the care of flocks, and value of their wool; the Greeks used it for the purposes of cloathing, and they refer to times much earlier than their own, as familiar in the same use; the Tyrian purple was employed in dying woollen cloth; and the early expedition of the Argonauts to Colchis, for what was called the Golden fleece, was no more than a voyage in search of this commodity. Naturalists may suppose their voyage was in search of gold, and the adepts pretend the secret of the philosopher's stone was couched under this mystery: but plain reason, and the most authentick accounts of the transaction, say nothing more than this; that the people of Colchis understood the management of sheep, and the manufacturing of their wool, better than any other nation of that time; and that Jason, and his partners in that expedition, after encountering many dangers at sea, brought back a quantity of the wool, and a number of the natives to manage the same article in their country. The city of Corinth became afterwards a general mart for wool: and after Pompey had dispersed the pirates, the same article was a very considerable branch of the commerce carried along the coasts of the Mediterranean.

In all these ages, nothing was known of Britain. The knowledge the Phœnicians once had of our country was lost; and they had never communicated it to any other people. This island subsisted as a place separated from the whole world, and unknown to its inhabitants; and the histories, such as they are, that give an account of Brute the Trojan, and his descendants, their wars and victories, mention not a word of this important article. Our ancestors, somewhat more civilized in those ages than they had been in the preceding, might, for ought we know, have begun to manufacture wool: that they might do so is all that can be alledged, we do not know they did; and of this we are very certain, that if they had the knowledge of it, they served none but themselves: they had no commerce with the rest of the world.

We not only know that many other kingdoms at that time were famous for their wool, but we are told of several by name. The same accurate writers who mention the commodities of Britain, and do not name wool among them, mention that article as a commodity in others. Spain is mentioned with great commendation, for the wool it produced in those times, and the manufactures made from it: some attribute



attribute the invention of weaving woollen cloth to the people of that nation. Wool was received in early times from many parts of the Euxine; and the trade of the Baltick was, in a great measure, supported by it. The Armenians purchased wool and woollen cloths of the Turks, in exchange for horses: and Rome in somewhat later time, received woollen manufactures from Alexandria. This all stands established on the best authorities; and is related by all the authors who have had occasion to mention the commerce of those ages. In all these times Britain continued negligent of this matter.

It will be seen, in the succeeding chapters, how valuable a part of our natural advantage we neglected in this article; and we shall, I hope, be cautioned not again to lose so great a benefit; which so many others have, at different times, taken from us, and will always be ready to take from us again.

### C H A P. XXXVII.

*Of the wool of different parts of the world; its condition and qualities.*

**I**N countries far north, the wool is generally coarse, and of little value. In Iceland it is as harsh as hair, and in small quantity. In Norway in general it is but poor; tho' there is some tolerably good; that of their natural sheep is short and coarse, and such as they bring over from other places often die in the hard winters. They work it up into manufactures at home, but they are of the poorest kinds: their cloth is little better than flannel, and the principal use of it beside is in a coarse kind of knit stockings, which they make for themselves, and the other northern countries.

In Sweden the wool is also coarse, short, and poor: they have been used, till of late, to have their woollen goods from us, but they have now encouraged manufactures so far, that they have a coarse cloth of their own fabrick, and to promote the care of this branch of their trade, a duty is laid on the English.

In Muscovy they have abundance of sheep, but their wool is not fine.

In Poland they have some wool, but it is not excellent.

Germany, in many parts, abounds in sheep, and their wool is fine, and the people understand very well how to make the best of it.

In the Austrian Netherlands there is abundance of fine wool, and many of the woollen manufactures have been either invented or improved to a great height there.

France is not famous for its wool, though some in the southern provinces is fine: they import a great deal from England, working up our own produce to supply other markets in our stead.

Spain produces a good quantity of wool, and it is the finest in the world.

Portugal has wool also little inferior to the Spanish: it is fine and delicate, and fit for the nicest works.

Italy affords so much wool that a great deal is annually exported, and it is very good: the Vicentine and Parma in particular are famous for a fine and valuable kind.



In Hungary and Transilvania there is a great deal of wool produced, though not of particular excellence, so that it is less sought by strangers, and in general it is worked up at home.

In Turkey they have abundance of sheep, and they carry on a considerable traffick in wool.

In Scotland a great deal of good wool is produced, though not equal to that of England. In Gallway, Twedale, and farther north, they have what is very fine, and they understand it very well. They had the art of making broad cloth in great perfection before the union. The Glasgow plads exceed all other manufactures of that kind; and they have many other very good ones. There is a method in the dying the red part of these manufactures, which they keep to themselves, and which gives them the pre-eminence in that manufacture, though all the arts possible have been used by our people to discover or purchase the secret. The Scots are more honest than our people of the same rank; it would not have been easy to have kept a secret of that importance in England, which was necessarily entrusted to so many persons.

In the East they less regard the produce of this commodity now; because their principal manufactures are in silks and cottons, but there is a great deal of very fine wool in Asia, Syria, and Persia. They have a particular breed of sheep, whose wool is long and greyish, and they make certain peculiar manufactures of it, and those much esteemed.

In China and the East-Indies the produce of wool is so great, that they shear their sheep three times a year: and in America they feed abundance of sheep, whose wool, in several parts, is little inferior to that of our own country.

#### C H A P. XXXVIII.

*Of the methods of managing wool in different parts of Europe.*

**T**HE French, who know where the best wool is to be had, get what they can from England, not a little from Spain, and purchase it wherever good is to be had in other places. The foreign, as well as their own, they divide into parcels, according to the goodness, before they work it up or dispose of it. Most other countries have the same practice, and from their dividing it into three kinds, this is called the triage of wool. These three kinds are called, the first, the second, and the third kind of wools. And when the fleece is sold entire, there is usually made a distinction, according to its quality, into a first or a second kind. The proprietor has his choice to sell his wool, as it is shorn, or to clean and separate it. In general the best method is to manage every commodity as well, and work it as far as the knowledge or convenience of the husbandman will permit; for those who buy things in the rough, always make themselves large allowances for waste and labour. In many articles the difference between selling the produce in this rough way, and selling it wrought, so far as the farmer can conveniently do it, is thirty per cent.

The



The wool of Spain comes principally from Castile, Arragon, and Navarre : the first is generally the finest. It makes an admirable mixture with English wools. Those of France are inferior to ours ; yet by a proper mixture of the Spanish, and a good fabrick, they have produced cloths very little inferior to our own, when we have kept our wool entirely from them. In Spain they are very choice of their fine wool : they have five different ways of selling it. They sell it, sometimes singly on the sheep's back ; secondly, coarse as shorn ; thirdly, washed and cleaned ; fourthly, wash'd, cleaned, and triaged ; that is, separated into the finest, second, and coarser kind ; and fifthly, on the sheep's back at a general price, to pay for one pile what other piles of the same quality shall be sold for. They generally find the fourth way the best for the seller, and the fifth the best for the buyer. The difference in quantity between the wool as it is shorn, and when cleaned, is about half. The second cleaning, which prepares them for cloth, reduces them near a fifth ; and this is the whole waste.

This will inform the farmer upon what conditions he may set the price of his wool, if he chuse to part with it rough, but it will always be his interest to work it as far as he can himself.

Having looked into the produce of the wool of different countries, we shall consider the nature of their pasturage, and other accidents ; that the farmer may see not only where the best wool is produced, but guess to what the excellence is owing.

Two things contribute to the fineness of wool, the sweetness of the pasture, and the cleanliness of keeping.

In Spain, the grounds are in a manner barren, and in many of the northern nations, the meadows are covered with a very rich grass : but the little grass of Spain is sweet, and this abundant quantity of the north is harsh and four. A coarse grass makes a coarse wool ; and to this we may attribute the ill success of those several schemes which have been practised, of carrying the sheep of wool countries into others : the kind is not of so much importance as the nourishment ; and the same sheep in a sweet pasture will yield the finest wool, that will afford but indifferent on a coarser grass.

The practical rule is, that the farmer who has a mind to raise the credit and price of his wool, should first chuse a proper breed, and then feed them principally upon his sweet high pasture grounds.

Cleanliness is the next article, and this follows the other in course, for the sheep on downs are always cleaner than those in low grounds. The French cannot be so careful in this respect, because the fear of wolves render it necessary for them to house their sheep in winter ; and in this case there is no possibility of their living so clean, as when they run in an open pasture, and touch nothing but the grass washed with the dews of heaven. Our covered fold will be little disadvantage to the wool, if the earth thrown into it be of a sandy or dry loamy kind, and none answers that purpose better.



*Of the origin of the woollen trade in England.*

**W**E have seen how late the people of Britain fell into the care of wool, and we shall find, upon farther enquiry, that the progress made in it was at first very slow. This is the more to be lamented, because we have the finest pastures in the world. The improved state of husbandry has, from time to time, brought in new advantages to tilled land; but at all times the pasturage must have had its character of excellence and superiority, nay probably in the times when agriculture was least improved, that part of our produce was best, because then the best land lay for it. Grass is a product of nature, in which she needs no assistance from the labourer, or husbandman. There never was any time in which this country wanted the means of feeding sheep, and consequently there has been no time when it might not have produced wool in abundance. Let the husbandman remember how many ages other nations ran away with the profit of this great commodity; and let him recollect later instances in which they have, and in which, I am sorry to say, they now do rival us through our neglect: what advantage they had before the Britons entered on the trade they may have again, if it be neglected on one hand, or restrained by authority on the other.

If we would know by what slow degrees the care of wool, and the profits rising from it, became known in England, we must refer to old records in which it has been named, or in which any thing concerning sheep is to be found. The generality of our ancestors, in early time, went naked, and skins were the covering of the rest; in the time of the Romans, commerce became more established in this island; and London was a place of great traffick: but wool was not one of the articles in which either our own people, or the Romans traded.

One of the earliest notices we have of sheep in Britain, with respect of their value, is found in Stillingfleet\*, who tells us, that between the years seven hundred and twelve, and seven hundred and twenty-seven, were made certain laws of king Ina, and in those a price was set upon sheep. The price of an ewe and her lamb together, till a fortnight after Easter, is set down at one shilling. The value of money was then very different from what it is now, but this, with all the allowances that can be made on that head, is but a very poor price. We may learn by it that in king Ina's time the care of sheep was grown to some concern in the island: and there are other passages of the same period, that shew wool was an article comprised in the purchase of these creatures; but by all we learn on this head, the art of working it was little known, nor was any of it exported either wrought or raw.

Alfred, a name famous for military achievements, and also for the care of arts and commerce, took no small pains to improve this manufacture; but it did not much succeed. In the year 885, he set a-

\* Chronicon Pretiosum, p. 20.



bout this great work, but wolves were too numerous in the island to let sheep be kept in safety.

The consequences of the encouragement this sovereign gave to the raising of these animals, was seen in the succeeding years; for in 918, Edward, who had married the daughter of a country gentleman, distinguished by the regard he had shewn to this great concern, and thence called by those who little understood what they read in earlier writers, a shepherd, had his own daughters instructed in the art of carding, spinning, and manufacturing wool. This double patronage bestowed by Edward, the countenance he gave to one who employed himself in breeding sheep, and to the example he set in making his daughters work the wool, was of so much assistance to the manufacture, that the pasturage of the southern countries became soon occupied in feeding sheep, and every one, fond of recommending himself to the royal favour, became a shepherd, or at least employed his attention greatly on that article.

Wolves were for some time the principal obstacle to the progress of this undertaking; but after many struggles with this inconvenience, Edgar, about the year 961, setting a price upon their heads, and by every other means encouraging their destruction, three or four years did the business: there was not in that time a wolf left in the kingdom. The value of the sheep rose in proportion to the number: for with the increase in the quantity of wool, the numbers of manufacturers increased, and the demand for it enlarged. In 720, in the time of Ina, an ewe and her lamb together, were valued only at a shilling in the best season; but in 1000, under the reign of Ethelred, a sheep alone was worth a shilling, without any restraint of season\*. This shilling was Saxon money.

This shews the value of sheep rose, but it also shews that it was slowly. No exportation of wool, or woollen cloth, is yet heard of: people principally wrought up the produce for the service of their families.

A hundred years after we find by an accidental passage, that the value of sheep was rather decreased, so that we may see the working up the wool did not thrive. The black book which contained the taxation of every man, toward the support of the king's household, mention money as an equivalent for cattle, and the sum on each article is stated. Ten years before this, if a sheep was lost the damage was estimated at five pence, but on this occasion the price laid upon him who chose to pay his tax in money, instead of cattle, was only four-pence in the place of one sheep.

Pursuing this subject in the old records, we find the sheep more numerous in all the succeeding reigns, and we see their value again increasing constantly with their number. In the time of Henry the first, about the year one thousand one hundred and twenty, forty sheep were valued at one pound.

In one thousand one hundred and eighty-five an antient record tells us, that by the custom of Beleshal, the tenants of Sherborn were, on

\* Chron. Pretiosum, p. 81.



certain occasions, to make their acknowledgment by delivering a ram, but if they chose to pay in money, the price was fixed at eight-pence.

The reader is not to imagine that this price established upon sheep, had regard to their flesh for food, without respect to the wool; all historians are silent upon the progress of that commodity and its manufactures, but we have, a few years after, a memorable instance of the regard shewn to it as a national commodity.

Richard the first, in the year one thousand one hundred ninety-tree, returning from the holy war, was taken prisoner by the duke of Austria. A vast ransom was required, and toward raising it one year's wool was demanded from two of our abbeys. This is a passage recorded by Rapin\*, and is supported on the best authorities; and this shews, though we have not had any regular account transmitted to us of the progress of this article of commerce, that all the time the price of sheep was encreasing, the value of wool was also rising, and that this was the principal cause of their encrease in value: at this period wool was become the first commodity of the island: the thing next named in purchases to money.

Till this time we hear nothing of any use of wool, except for home consumption, but this transaction seems to have opened the eyes of the neighbouring nations. Having received English wool in payment they found it excellent, and they began to think of it as a purchase. The pastures of Britain now shewed their excellence for the feeding this useful animal, and the husbandmen began to acquire a reputation for its management. Exportation of wool became a common practice, and the article grew so important, that it was the great source on all emergencies. It was the land tax and the malt bill of those early periods.

The first notice of its exportation is in the year one thousand one hundred and ninety-eight; five years from the time of Richard's ransom. In this year we find, in Maddox's history of the exchequer, that Gervase de Aldermanbury †, rendering an account of the chamberlainship of London, gives in this singular and important article: fines from merchants for permission to export wool and leather twenty-three pounds twelve shillings. When quantities of wool began to be exported, the manufacturing of it at home encreased. The same exchequer account gives a list of several sums by the sale of wool at home; of twenty pounds from one person, and of two hundred and twenty-five marks from the seizure of a quantity that was attempted to be exported without paying the fine for leave. The quantity of wool seized was forty-five sacks. Each sack was valued at five marks, and each sack contained twenty-six stone of wool. This settles the price of wool in England, in the latter part of the reign of Richard the first, at little more than two and six-pence a stone. This two and six-pence was, at that time, one eighth of a pound silver, and was

\* Rapin's Hist. of Eng. v. I. p. 254.  
chequer, p. 532.

† Maddock's Hist. of the Ex-



equal to about three times that quantity or weight of silver now; that is, to seven shillings and six-pence.

The reader will not blame us for descending to particulars in a point of this curiosity and importance. We shall endeavour to trace the history of this commodity from the best records of earlier time, and shew its advances and decline under the different encouragements or oppressions of the manufacture.

About thirty years after we found the way of serving our neighbours with our wool; we improved so far in our own manufactures of it, as to get into the art of dying. At first wool was only wrought up in a coarse plain way for the cloathing of the farmer and his family: by degrees those who best understood the working it up, brought what they had to spare to market; but all this time the wool was only wrought up as it was furnished by the sheep, and all cloth was of the same colour. Those who imported wool and woollen cloth from us, in its natural colour, dy'd it at home; and we soon learned the art of doing the same here. We read in the statute book, that in the ninth year of Henry the third, dy'd cloth was limited by a certain law, as to its quantity and measure. Our wars with France broke in upon the progress of the national trade in 1242. The persons and effects of the English merchants there, and those of the French merchants in England, were seized in consequence of hostilities between the two nations; and in 1275, all commerce was prohibited between England and Flanders, upon a like account; but on this occasion we find an instance of the great height to which the wool trade of England was arrived at that time, for a few Flemish merchants were permitted to carry over a quantity of English wool with them, paying the king for the permission. This quantity was no less than a thousand and sixty-eight sacks, and the price for leave of exportation was ten shillings a sack. We see by this how swift a progress the commerce of the kingdom, in this article, made, when the husbandmen understood the value of the commodity; and the legislature encouraged its manufacture.

We find by these accounts how little historians and others have considered this important article. Those who speak of the manufacture of broad cloths in England, follow one another in placing the time of their being first made at the year 1331. We see from this circumstance, countenanced by the statute book, that they were not only made but dy'd so early as in the year 1220. one hundred and eleven years before; and probably the origin of the manufacture was much earlier than that. The quantity of wool our country produced soon after, is to be guessed from the vast exportation we have named under those Flemish merchants; and this is recorded punctually by Rymer\*.

In 1284. foreign merchants were permitted to establish themselves in the kingdom, for the encouragement of the woollen manufactures. They had till that time been obliged to lodge in the houses of our own people, and could not trade otherwise than by making their

\* Rymer, vol. 2. p. 50.



landlords their brokers; but now they were permitted to traffick in their own names; and the privilege granted to them was of the utmost benefit to the trade.

In 1291. Sandwich in Kent was made the general market, by an act of Edward the first, and so vastly did the trade encrease, and the manufacture flourish, that five years after the custom was raised from twenty to forty shillings a bag; and the traffick was able to support it. This demand was indeed repealed, but not because it would have ruined the trade, but because it was made by the king's sole power. That was a stroke too arbitrary for those days of virtuous liberty: the merchants exclaimed against it, and they obtained a release from the absolute exaction, the additional duty being charged by this act upon them with such limitations, that it was in a manner dependent on their pleasure; and soon afterwards it was left to the determination of parliament.

A few years after, we find the traffick for wool and woollen manufactures very flourishing in London; and several of the sea port towns. The king's duty upon exported wool was established according to the weight; and the scales for weighing it in all parts were made from those in London, and delivered in a solemn manner by the lord mayor into the exchequer, to be sent to their respective places.

In 1297. the wars with France demanding a great supply: the woollen trade was so flourishing that recourse was had to it. The parliament granted for two or three years forty shillings a sack upon wool. This was the exaction that had occasioned so much disturbance at first; but now it was legally established and regularly paid. The king promised never to demand more than the old duty, without consent of parliament: and the woollen trade flourished under this large drawback, and the disadvantage of a war together.

These were times of honest government. The king was thankful to his subjects for so large a supply, and he was happy to find the woollen trade could bear it: but he demanded it no longer than it was required by those exigences of the state, on account of which it was raised. He called a parliament, and of his own free accord gave up the additional duty, publishing a proclamation that no more than the old sum should any where be demanded. The price of sheep naturally rose with the value of their wool, but still the number made some alteration. We read in Thorn\* of three shillings apiece being given for three hundred sheep; but it was at an installation feast, 1309. The current price about that time was much less, as we find in the acts of the common council of London, and in Dugdale.

In the year 1315, the price of sheep is established in such a manner, as to give us a fair insight into the value of wool at that period. The sheep, if delivered shorn, was fixed at fourteen pence; if unshorn at twenty pence †, but we must not extend this consideration farther than to the value of the wool, for it was a time of famine.

From this period the woollen trade became an object more than

\* Decem Scriptores.

† Stillingfleet's Chron. p. 72.



ever of the publick concern. Persons of all nations who could improve the manufacture of broad cloth, were encouraged to come over: and among numbers brought under great encouragements from Flanders, Brabant, and Zealand, there were some so worthy of the advantages they received, that they soon set the trade upon a most respectable footing abroad, and upon the most profitable foundation at home. In consequence of the greater traffick in this article, the price rose; and more assistances were drawn from it for the state: in Edward the third's reign, we read of subsidy after subsidy on wool: and in Richard the second's more subsidies were demanded; the traders complained, and the matter being candidly examined, it appeared that though they were not without reason of complaint; the trade could bear more loads, and they might still raise fortunes.

In the reign of Henry the fourth the parliament granted the king, for a limited time, a subsidy of fifty shillings upon every sack of wool belonging to the natives, and four pounds on those of strangers exported; and such was the produce at that period, and such the foreign demand, that the quantity exported was not less than a hundred and thirty thousand packs in a year. In Richard the second's time the subsidy had amounted to a hundred and sixty thousand pounds.

The same subsidy that had been granted to Henry the fourth, was allowed for four years in Henry the fifth's time.

In the reign of Henry the sixth we find thirty-three shillings and four-pence a sack allowed to the king on the natives property, and forty-three shillings and four-pence on that of strangers. The woollen trade encreased under all this demand; and Norwich about this time became eminent in it.

In the former reigns the large subsidies on wool had been granted only for two, three, or four years, in time of necessity; but in the reign of Edward the fourth, the charge of thirty-three shillings and four-pence on the wool of the natives, and of three pound six and eight-pence on that of strangers was granted to him for life. This proved no check upon the traffick. Enclosures became frequent; the land was improved, the management of the cattle and their wool was better understood; and England carried the praise for this article before all nations.

In the reign of Richard the third, though the traffick was encumbered with large subsidies, it encreased continually. In the reign of Henry the seventh, the greatest regard was shewn to trade in every article, and in none more than this: the exportation of wool was limited, and the manufacture of cloths encreased accordingly. In Henry the eighth's reign the produce of wool was greater than at any time before; and its price encreased with the quantity: farmers were laid under limitations, as to the number of sheep they were to keep; but these were very extensive, and we may see by the account preserved of this transaction, and of the price of things at that time, to what an advance the care of that animal, and the price of its flesh and wool, had risen.



No one was to have more than two thousand; but this with many exceptions. The statute, by way of reason, recites “ The advanced  
 “ price of all the native commodities in the kingdom. That some  
 “ persons had at that time vast numbers of sheep, which for victual  
 “ had risen in price from two shillings and four-pence, or at the most  
 “ three shillings, to six shillings, or five shillings, or four shillings at  
 “ the least; and that a stone of cloathing, heretofore in some shires  
 “ accustomed to be sold for eighteen-pence or twenty-pence, had ri-  
 “ sen to four shillings, or three shillings and four-pence at least. In  
 “ others, where it had been sold for two shillings and four-pence,  
 “ or two shillings and eight-pence, or three shillings at the most, it  
 “ was then sold for five shillings or four shillings and eight-pence the  
 “ least.”

If we look back to the prices of wool in the thirteenth and fourteenth of Edward the third, the lowest, viz. the wools of Cumberland and Westmoreland, were sold for more than two shillings per stone, exclusive of the duty, which was something more than one shilling and six-pence; and those of Salop, at more than four shillings and ten-pence per stone, in like manner. So that in fact, there seems to have been at this time, no advance in the price of wool from the period just mentioned: but very much the contrary, considering that the shilling was then two hundred and sixty-four grains; and at this time, but one hundred and eighteen. Nor was it any advance from the cheap price of which H. Knygton speaks, because the shilling was then two hundred and thirteen grains. Much less was wool dearer at this time, than in the fourth of Henry VI. The price being then not only nearly equal to the highest rate mentioned in this act, but the shilling then, at the lowest, contained twenty-four grains more than at the time of the act. Therefore we are to suppose the complaint then made concerning the dearness of wool, to have had respect to some intermediate later times, in which the price of wool does not now appear; and which was probably occasioned by monopolies.

As to the price of food it will not be amiss to insert here a little piece of history from Stow, in the year one thousand five hundred and thirty-three. It was enacted, “ That butchers should sell their  
 “ beef and mutton by weight: beef for a half-penny the pound;  
 “ and mutton for three farthings: which being devised for the great  
 “ commodity of the realm, as it was thought, proved far otherwise.  
 “ For at that time, i. e. one thousand five hundred and thirty-three,  
 “ fat oxen were sold for twenty-six shillings and eight-pence, fat  
 “ weathers for three shillings and four-pence, fat calves for the like  
 “ price; and a fat lamb for twelve-pence. The butchers sold penny  
 “ pieces of beef, for the relief of the poor; every piece two pounds  
 “ and a half, sometimes three pounds. And thirteen, sometimes  
 “ fourteen of these pieces for twelve-pence. Mutton eight-pence the  
 “ quarter, and a hundred weight of beef for four shillings and eight-  
 “ pence. What price is has grown to since needs not be set down.  
 “ At this time also, and not before, were foreign butchers permitted  
 “ to



“to sell their flesh in Leaden-Hall market of London.” I suppose by foreign butchers, he means such as had not served their apprenticeship in London.

## C H A P. XL.

*Of the wool trade from the time of Henry the eighth.*

**H**USBANDRY had been in early times little understood in England, but the regard to wool, the demand for which was so considerable, and the price so large, gave a spirit to the people, which we wish had been continued to the present.

In Edward the sixth's reign we had farmers in England, who understood the management of pasture ground so well, that it were happy if books had been written on the subject, which had perpetuated their improvements. The great benefit of enclosures was understood fully, and they encreased in this reign. The care of the pasturage grew with the number of enclosures, and the thriving of sheep, and the price of wool rose with it. It sold in this reign dearer than in any of the preceding. Statutes were made from time to time, to encourage the manufacture of cloths, and marts were established in different places.

In the reign of Philip and Mary, the subsidies granted to Edward the sixth were continued: many good statutes were enacted in favour of the woollen manufacture in this reign; and it throve greatly under the prudent regulations which were established, and extended itself to many parts of the kingdom.

In queen Elizabeth's time a subsidy was granted for life on this article, included in tunage and poundage: many good statutes were made, and numbers of the French and Flemish leaving their native country because of persecution, brought over their secrets, and encreased our credit. In this reign wool unmanufactured rose from its former price, which might be called thirteen and four-pence to two and twenty shillings a tod.

We may establish the period from the end of Edward the sixth's reign, to the end of queen Elizabeth's, as the most flourishing of all times for the wool trade of England. It has never risen much higher since, and it has very often been much lower; in general, considerably below that standard. Yet even in that time we were far from supplying all the world, or even all Europe, with cloth; for there were many other countries very eminent in the same manufacture: this therefore is an imaginary notion; and it is altogether erroneous to suppose we ever did, or ever shall have that vast trade to ourselves. It is enough if we can get the superiority in the manufactures, which doubtless we may; and we may be proud of our success, if we can yearly bring in such sums as it then raised; which were, moderately speaking, near three millions a year.

In the time of James the first wool afforded large subsidies: new regulations were made, and statutes enacted: monopolies were introduced, but the clamours of the people got the better of them: the desire of growing rich too fast became general among the woollen dealers, and hurt



hurt the trade: abuses were committed in the making cloth; and our credit declined in foreign markets. Proclamations were published to prevent the exportation of wool, and search was made into the nature of the abuses; but in vain. The manufacture sunk, and the price of wool fell from thirty-three to eighteen shillings a tod.

The beginning of king Charles the first's reign, promised the revival of the woollen trade; but the disputes succeeding reduced it lower than ever. Proclamations took the place of statutes; and the exportation of wool was forbid by several of them. In 1640, wool was advanced again to twenty-four shillings the tod.

In 1671, many attempts were made to restore these manufactures to their former excellence. The bad consequences of suffering our wool to be exported unmanufactured were shewn; and propositions were made for gaining several hundred thousand pounds a year, by throwing that trade into a better method: but these were times in which men better knew what should be done, than how to do it.

In 1685, the French began to supply foreign markets with what they called English cloths. These had been made of English wool, and while that was suffered to be exported; and so many disadvantages laid on our manufactures at home, it was no wonder they could under-sell us. The publick attention was waked by this, the exportation of wool was absolutely prohibited, and great encouragements were given for the produce, and working it here into marketable manufactures. This raised again the spirit of the people, and the advantage was soon seen: happy had it been if the measures so well projected had been as properly continued. When wool, except in manufactures, was prohibited exportation from England, the French, and other neighbouring countries, got it from Ireland: this was soon seen, and its disadvantages; and laws were enacted against it.

In 1703, the woollen manufacture began to flourish again in England: a treaty was soon after made with Portugal, very advantageous to them; and there was the appearance of their again making great progress. The French droop'd in this article, for some time after they were deprived of our wool; but they found the way afterwards to rival us, with what they produced at home, and got from elsewhere; and our manufacturers saw there was no way but integrity in their dealings, and a care of the trade that could give them the preference. Integrity was wanting in some, and knowledge in others, and for several succeeding years things went worse and worse: the neglect of those most concerned let France get our wool again in great quantity, and our own manufacturers sunk in proportion: for this has been found at all times, that although the French can carry on their traffick without us, yet they always succeed best when they have most from us; and we droop in proportion.

On two things depends the flourishing state of the British woollen manufacture: the care of the husbandman in the proper management of his sheep and their produce; and the preventing the exportation of wool when we have it in the proper condition.



## C H A P. XLI.

*Of cleaning, carding, and greasing of wool.*

**W**E have laid down the rules needful to the husbandman for the choice, breeding, and feeding of his sheep, and acquainted him with all that is needful to be done in the shearing. We will suppose therefore he has got his wool from the backs of his flock, and proceed to tell him what he is to do with it. The mistress of the house naturally undertakes the office of preparing the wool for her families clothing: the husbandman is therefore to deliver to her such a quantity as will answer this purpose, rough from the hands of the shearers. The first thing to be done with this is to open it with shears, and cut away all the foul pieces, knots, and lumps of whatever kind. These must be laid by for meaner purposes, and the rest thus cleansed must be broke and divided very carefully between the hands, that there may be none of it left matted together.

When it is thus clean, it is ready for carding: but as some will be required white, and some coloured, it is to be separated. Such as is for colours must be divided into different parcels, according to the intended dyes: the usual way is to keep each parcel in a bag of netting, with the weight marked upon it. These are then to be sent to the dyers. The white wool as it is, and the other when dyed, are to be wrought in the same manner.

The first operation is carding: the intent of this is to mix equally every part; to tear it open perfectly; and to discover and separate any knots or lumps, which may have been so small that they were not observed in the breaking of the wool by hand. This should be carefully performed by means of a pair of stock cards well fastened to a form. The whole quantity is to be over and over combed and carded on these, and the least knot that is found is to be separated.

When the wool has gone through this management, it is to be greased. This is done with oil; and the common kind used is the rape oil made from coleseed. The wool is to be spread evenly upon a large flat bed, and the rape oil is to be sprinkled on it, till there is enough put on to wet every part. Then the wool is to be moulded and worked about with the hand, that every thread may be moistened. There must be regard had to the quantity of oil employed: it would be easy to wet the wool, by pouring on a great deal of oil at once, but this would spoil it: the art consists in having every part wetted, and yet none too much. In this consists the art of greasing: it is of the greatest consequence, to moisten the wool well with a little oil, for on this depends the perfection of the web. If too much be used the thread will not draw, but will fall into small pieces.

There is no better way of finishing this right, than the trying it at times as it is doing. When the wool is greased it is fit for spinning: therefore nothing will be so proper as to have a wheel by, and try it from time to time. A little oil should be worked in at first, and then the wool tried on the wheel: if it draws dry and breaks, a little more oil is to be used; for the use of this is to keep it moist and sup-



ple, and to make it hang together: this purpose it excellently answers when a small quantity is well mixed with the mass; but when too much is used, and it is put to the wool in a careless or unartful manner, it takes a contrary effect. In general wool requires somewhat less than a third part of its own weight of oil: therefore weigh the wool, and to every three pounds allow a pint of rape oil: let about two thirds be used at first, and then the wool tried on the wheel; if this does not answer, let some more of the quantity be used, but carefully and with great discretion. Any fatty substance will do: and indeed any kind of oil. Hogs lard will answer the same purpose; but the oil mixes more easily. When any solid fatty substance is used, it must be melted, and carefully sprinkled on.

## C H A P. XLII.

*Of tumming and spinning of wool.*

**W**OOL may, for some purposes, be spun as it comes from greasing; but the better way is to use this only as a preparation for tumming. Tumming is another carding, and brings it to a great degree of fineness and suppleness. The method is this.

When it is thoroughly oil'd, let it be well worked in the hands, and then spread out as at first. Let a pair of long-tooth'd cards be made ready; and let it be very well carded and combed again, drawing it perfectly fine; and separating every thing that is tangled, or uneven. These pieces are called tummings, and are to be reserved for other purposes. They are not to be mixed with the first foul parcel, because they will be a great deal finer.

The tumm'd wool is ready for spinning. The wheels must be large, and a steady and careful hand must be employed. There is so much difference between the wool of one shearing and another, that all will not spin to the same fineness. If any one should force a coarse wool to run into a fine thread, it would not answer in the other parts of the manufacture. When the wool is suffered to run from the wheel, as it naturally offers, it will hold good in every succeeding process.

A judicious person will see, from the nature of the wool, what service it will answer: but whether it be formed for a larger or a finer thread, the same care is to be taken in every article. The difference arises from the breeds of sheep, and from the care taken in their management.

There may be two kinds of thread spun from all wool; and indeed it always should be so. Two manners of spinning should make these two kinds, which are called the warp and the woofe. The warp is to be spun close, round, and hard twisted, and it should be strong and well smoothed: the woofe may be spun more loose, and but half twisted. The reason will appear when the farmer considers their use. The thread of the warp is to run through the whole, and to endure the fretting and beating of the beam: the woofe requires no great strength or smoothness, because it only crosses the warp without violence or straining. It is not only that the woofe does not  
require



require the firmness and hardness of the warp thread; but its being looser and softer makes it answer the purpose better: it beds the closer and evener in the working.

The intent of the woofe is to cover in and unite all together, and this is to be perfected by beating in the mill. This is an operation needful to the cloth, yet the less can be made to answer the better. The warp is the thread on which the strength of the fabrick is to depend, and the other being hard, makes the cloth fret and wear, whereas the leaving an open loose thread for the woofe, gives it a pliable softness.

We hear much of late of the French cloths; people praise them for their pliantness and easy wear; and though they are in reality greatly inferior to the English, many prefer them for this reason. The difference is altogether owing to their spinning two threads out of every parcel of wool, and keeping one for the warp and the other for the woofe, the latter of which they make so loose that 'tis hard to work it. A very little beating brings the cloth into a body, and when finished it is soft and pliant. One would think these French cloths, by their look and feeling, could do little service, but the contrary is found upon trial. They never crack, and the looseness of the woofe thread rising from time to time, keeps them from wearing thread bare. Our hard cloths are liable to grow bare at the seams; these never do; because they are less harsh. They are fitter for gentlemen's service than for labouring people; but it would be easy to follow that practice more moderately.

### C H A P. XLIII.

*Of the winding the thread, and finishing the work.*

**W**HEN the wool is spun into yarn, it is to be wound. Those who continue the old housewife's practice of spinning it all alike, have nothing to do but to wind it off as it is finished from the broch, into a clew: but the better way is, to spin it in two kinds, and wind each off in its separate clew. In this condition it is ready to be made into cloth. The making it up is the business of the weaver, a trade to be learned by an apprenticeship, not by any description that can be given in writing; nor is it our purpose, for we limit ourselves to the business of the husbandman, for whose service this work is written. However, though we are not to instruct the weaver in his profession, it will be proper to inform the farmer so far in the nature of it as concerns himself; that is, to give him so much insight into the work, that he may know whether he has justice done him or not.

Before the yarn is delivered to the weaver, the owner should know how much cloth it may make. The quantity of cloth will be determined by the weight of the yarn. It will be proper to weigh it when in the clews. The general computation is, that it will run yard and pound; provided the wool have been originally good, and the spinning carefully performed. If the yarn be coarse it will make less.

The next care is to observe how many pounds of yarn are laid in



the warp, and so many exactly must be reserved for the weft or woofe. He is then to observe that the whole be woven close and true; and in every part alike.

From the weaver the cloth is to be carried to the fulling mill, some yarn will make the cloth require more milling than other: but let him see that it have not more than it requires.

The scouring earth is the next article, and none is of more importance. It is a necessary ingredient, but it may be a hurtful one. Its use is to clean, but it may tear the cloth: its fineness is the great care, for if it be coarse, and the work ill managed, it will beat holes in the cloth.

From the fuller the cloth is to be carried to the sheerman, this workman is to hurle it, and dress it sufficiently; and sheer it according to his purpose: moderation is the best rule. If it be left too rough it will not wear clean, and if too close it will be soon thread-bare.

#### C H A P. XLIV.

##### *Of the dying of wool.*

**T**HE husbandman will consider we are writing solely for his service, and the reader who has candour will not pursue the subject farther in this place; or censure us for having considered it thus far. We do not intend to teach the art of dying any more than to instruct our husbandman in the trade of weaving. We only aim to give him what information may be needful. We have told him how he is to judge of the making up of his cloth; but in this we shall proceed a little farther. We shall shew the countryman how he may tinge his wool for his own use at a small expence, and do in a manner all within himself.

The colours may be reduced to a small number. Black, red, blue, green, and yellow, may be named as the five principal, and if we add to these a pale purplish, an ash colour, and hair colour, from one or other of these, and the mixtures composed, as we shall shew from these variously combined, he will draw all the variety that he desires.

For blue, grind in a mortar a pound of indigo-blue, and mix it with two gallons of stale urine, set it on the fire, stir it well together, and put in the wool when it is made moderately hot. Let it continue some time, and it will have a good strong blue colour. The quantity of the ingredients must be proportioned to that of the wool; and the best time for dying is before the oiling.

To die black, beat to a gross powder two pounds of galls, put them into a pot with two gallons of river water, put to them one pound of common green copperas, boil them up well together, and the liquor will be like ink. Put the wool into this and boil it. Then let it cool, take it out, and hang it to dry.

To dye red, set on a quantity of river water, in a large earthen vessel. When the water is scalding hot put in a peck of wheat bran: let this boil a few minutes, then pour it into a tub, and put to it twice



the quantity of cold water. Set this by for a week. Then weigh the wool you intend to die red, put it into the water and bran; and with it, to every ten pound of the wool, one pound of allum. Let these boil together an hour: then take out the wool. Beat to powder a pound of madder root, put it into bran and water, and when it is hot, and the madder is well mixed with it, put in the wool, break and divide it well with the hands; and when the liquor is so hot the hands cannot bear it, stir it about with a stick; when it is well coloured take it out; and hang it up to dry.

To die yellow boil the wool in allum water, made as strong as before directed; then take it out, and hang it to dry. Set on a large pot with river water, and a good quantity of dyer's weed, of which, as also of madder, we have spoken in their place. Put the wool into this, divide and break it well, that it may receive the colour throughout, and it will thus become of a very good strong yellow.

To die green, the husbandman's best method is first to die his wool blue, and when it is dry in this colour let him set on a pot of water with dyer's weed, and put in his blue wool. It will receive the die in the same manner as the other, and by a natural consequence the wool become green; because a mixture of blue and yellow makes green.

To die a pale purple the same ingredients are to be used as for dying black, only in less quantity, and in a different management. The black is only a purple carried to that extremity. This is plain from experiments easily tried. The same ingredients that make this black die make ink, and they will make purple instead of black in a smaller quantity. If copperas be dissolved in water, the liquor will be clear. Then let galls be boiled in water, and some of that being dropped into the other it will raise a purple cloud, and when more is added it will be darker, till it become quite black. In the same manner this die, which is for black in the common way, may be made to answer for a pale purple. Bruise some galls to a coarse powder, set them over the fire in a vessel of river water, and when the whole is hot put in the wool. Let it boil half an hour, then take it out and hang it to dry. The colour of the wool will be scarce altered by this. Let the liquor be poured off clean from the galls, and put to it a smaller quantity of copperas than is ordered for black. The liquor will instantly become black. Draw the wool lightly through it; and it will get a pale purple tinge. If it be not deep enough put it in again. The care must be not to make it too deep.

To die hair colour, set on a pot with strong allum water: boil the wool in this, and then take it out. Then mix together a good quantity of foot and urine, and when they are hot put in the wool. Let it remain a moderate time, then take it out and hang it up to dry. This makes a very good, serviceable and lasting colour.

To die ash colour, make a liquor in the same manner as for the pale purple, but instead of putting in the wool boiled only in galls, use wool died red, as before directed, with madder. This will make a pleasing ash colour, with a light glow of the red.

This is the method of dying the useful plain colours, in an easy and



cheap manner; and any one may make a variety of mixtures in cloth from these simple dyes in the wool. The wool is to be dyed before the spinning; and in treating of the mixed colours for cloths, in the next chapter, we shall pursue the same method, ordering them to be made from the loose wool thus dyed; nevertheless, if any chuse it, they may in the same manner, and with the same liquors, dye the yarn or thread after it is spun, or even cloth after it is wove. Circumstances may sometimes render this management necessary, though the other is preferable.

## C H A P. XLV.

*Of mixing the coloured wools for weaving.*

**O**UT of the plain colours it will be easy to make several mixtures, and those for service are better than the simple colours themselves. The time for doing this is, when the wools are dry, and before they go through any other operation. Nothing prepares them so well for spinning; for nothing renders them finer than the division in mingling their colours.

If the dyed wool be intended to be wrought up in its plain colour, it is to be treated exactly as the white in all respects, oiling, tumming, and the like; but if it be intended for mixture, that is to be made before any thing else is done to it.

Mixed colours may be comprised under two heads, those composed only of two, and those composed of several colours.

Of the first kind the best are those made up of the darkest and the brightest colours: two light or two dark colours together make no considerable variations. The proportions of the several colours may be varied without end, but there is one proportion which is in general better than any other. This is when a proper light and a proper dark colour are chosen, to weigh two pounds of the dark, and one of the light, and in the same manner for any larger quantity, the bright colour being only one third part of the whole. If we suppose blue and red to be the two plain colours, of which a mixture is to be made, and the whole quantity intended to be used to be fifteen pounds; there should be ten of the blue, and five of the red.

The colours thus produced are what are called mixed colours in a distinct manner, for when more are used they are called medleys: the way is this. Suppose three colours are to be mixed, if two be dark and one light, the method is to take an equal quantity of each of the light colours, and twice the weight of both the others, of the dark one; on the other hand, if it be a medley of two dark colours and one light, then an equal quantity of each is to be taken, and they are to be perfectly well mixed together. When the wools of these colours are weighed out, a large sheet is to be spread upon the ground, and upon this is to be laid an even and thin layer of the darkest colour, or of one of the dark colours, when two are equally dark: upon this is to be spread another layer of the lightest, and so on interchangeably layer over layer, till the whole quantity is spread on the sheet. Then this wool is all to be rolled up into one thick, hard, and stiff roll.

The



The way is to begin at one end, and carefully turn up the edge round itself. This makes a beginning, and the rest all rolls upon it very easily; a steady hand is to be used, and the whole will be thus brought into one long thick mass. One end of this roll is then to be made fast in a frame, or a person is to kneel upon it, to keep it from moving or untwisting, and beginning at the other the whole is to be pulled out into small pieces. The spreading and rolling of the wool had before partly mixed the several colours, but this does it entirely.

When this is done the wool is all to be carded and combed together, by a pair of stock cards well fixed to a form. This compleats the mixture, it grows into an even and uniform mass; and if there be any knots or lumps in it they are to be carefully separated.

This combing is to be done in the same manner as in the management of white wool; and after this the oiling, tumming, spinning, winding, and warping, are to be performed. The cloth thus made has a good look, and wears clean: none is fitter for the service of the family.

The farmer or his wife may thus, without farther information, go through so much of the wool-dressers and dyers business as is necessary for their own concerns, and in places where those trades are not at hand, it is a great convenience to be able to supply them at home.

## CHAP. XLVI.

### *Of hides and leather.*

THE wool being disposed of, the care of the hides of sheep, oxen, and other beasts remain, and is the farmer's next consideration. Hides are of various kinds, according to the creatures; and are put to different uses: and they may be sold either rough, or with some degree of preparation. The entire dressing of them is the business of a distinct trade, or taking in the whole course of the subject, of several trades; however, it is proper he should know so much of the intended operations, as to be able to suit his hides to them. The skin of the cow and ox kind is so much above the others in use, that it has, in a manner, appropriated the word hide to itself; these being called hides, and others skins.

The farmer usually sells his oxen or cows alive at market, or to the butcher, and has no farther care about them; but he may have occasion to kill them himself. The hide then is sold separate. If he dispose of it just as taken off from the carcase, it is called a green hide: but this is the least advantageous method, because the purchaser knows it will spoil upon the farmer's hands, if he does not know what to do with it farther, and therefore thinks he will take what is offered for it.

A hide will keep a great deal longer in winter than in summer. Those who deal in them largely are forced often to keep them some time; or to send them to a considerable distance before they are wrought. And in this case they have a way of preserving them with salt: this is in the farmer's power, as well as theirs: the hide will not be at all damaged by it, and he may preserve it thus to a better market. A good quantity of common salt is to be mixed with a tenth



part of allum beat to powder. The hide is to be spread upon a floor, and a stout fellow is to rub and work this in well with his hands all over it, and particularly where there any crevices, or thicker places than the rest: when it is thus well salted it may be kept some time. The best method is to double it up, and lay it on a shelf in a cellar.

This will answer the purpose of keeping it some days; but if a longer preservation be required, then two days after this first salting let it be spread out again and rubbed well with salt and a little salt petre. A hide will thus be preserved any reasonable time.

Hides may be preserved dry in the hair, by carefully hanging them up single in an airy place, wiping them frequently and turning them till they harden.

The buffaloe hides from some parts of America are sent over in this manner, and are dressed afterwards.

The hides of the cow and ox kind fall into the hands of the tanner afterwards for leather; but those of other creatures are dressed by other trades. Shagreen is a skin prepared in a particular manner; and parchment and vellum are also manufactures of skins.

The skin of the sheep is the proper material for making into parchment, though in some places goats skins are used for that purpose.

Vellum is made of the skins of sucking calves: and shagreen of the skin of the buttocks of an ass. This last is a manufacture of the east. Chamois, or as it is commonly called, shammy leather, is made of the skin of a particular kind of goat; but is commonly in England no other than a sheep skin dress'd in a particular manner.

The skins of sheep and calves pressed in other ways, make also leather of various degrees of value for the covering of books, and other purposes, the calf skin being more valuable than the sheeps.

The farmer sees here what are the uses of his various hides, and will know by this general account, that he needs not want purchasers. The principal, which are the hides of the ox kind, go to the tanners; and he is ready to receive them in either of the conditions we have named, that is green, salted, or dried. He throws them into pits with lime and oak bark, and by that means takes off the hair, and hardens the skin. The tanner, when he has gone through his business, delivers the hide to the currier, who finishes the preparation and delivers it for use. We shall not attempt to inform our husbandman in these particulars; they are separate trades, and never can fall within the compass of his practice. All that he can be required to know is how, to whom, and in what manner to dispose of the skins and hides.

End of the Tenth Book.



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A  
COMPLEAT BODY  
OF  
HUSBANDRY.

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BOOK XI.

*Of beer and cyder.* IN TWO PARTS.

PART I. Of MALT LIQUOR.

CHAP.

1. *Of making malt.*
2. *Of the drying of malt.*
3. *Of the several kinds of fuel used in drying of malt.*
4. *Of the right management of malt, and of additions to it.*

CHAP.

5. *Of the several kinds of malts and waters.*
6. *Of brewing in general.*
7. *Of brewing in private families.*
8. *The advantage of brewing at home.*

PART II. Of CYDER.

9. *Of chusing a spot for an orchard.*
10. *Of disposing the orchard.*
11. *Of making the plantation.*
12. *Of the common management*

- in the making of cyder.*
13. *The reverend Mr. George Turner's method of making cyder.*

The INTRODUCTION.

**I**N this, as in the preceding parts of this work, we shall lead the husbandman in the road of reason and experience: considering what has been written as it deserves; and much more what has been practised as it has come to our knowledge. We shall begin from the foundation, that he may be acquainted with every part, and understand every thing that is directed to be done.

BOOK



## BOOK XI. PART I.

*Of MALT LIQUOR.*

## CHAP. I.

*Of making malt.*

**M**ALT is a preparation of barley, fitting it for impregnating water with its taste and qualities, in the most pleasant, wholesome, and advantageous manner.

We shall not trace the subject farther back than to the thrashed and cleaned barley, in this place; because we have before brought that grain from the seed to the perfect corn, in a due course of husbandry. Only we shall add, that as the best barley will always make the best malt, there is an advantage also in its having grown on a proper soil, and having been dried by a right management. On these two articles depend the quality of the malt.

In general that barley which is tenderest and most mellow, is best for the purpose; that which is hardest is worst. The manufacturers call this last steely barley, and avoid it; knowing it will give them most trouble, and succeed least in the brewing.

It would not be of much consequence to the generality who brew, to acquaint them with the advantages of taking the grain from a proper ground, and drying it in a proper manner; because they cannot know those things: but we are here writing to the farmer, who is to make his malt from barley of his own growing and drying: he therefore may chuse such as will answer best. The best barley for malt is that which has been raised on a chalky soil, and the worst is that of clay. The difference is greater than any would conceive; the barley that has grown on clay being naturally hard, and the other tender. In general, the toughest lands yield the worst barley for malt; and the lightest and mellowest the best. Therefore let him take such as grows on the lightest soil he has.

Good malt requires the grain full ripe: it is common to mow barley before it is ripe: in this case the corn is lean, and will never yield a rich malt. When it has stood to a proper ripeness; it must be carefully dried after cutting: for if it be housed before it is seasoned, it will contract an ill taste; beside that it will give a great deal of trouble in the making, not coming so regularly as better grain. The barley thus managed, is to be thrashed, and then it is ready for malting.

Making of malt is softening the flour of the barley, and then



then properly drying it. It is mellowed by water, and it requires a different time of steeping, according to the nature of the grain. The barley is to be put into a cistern, or other vessel, and water to be poured in till six inches deep above the grain. This will allow for the swelling, and will do the business in two or three days: the finest barley always takes the water the most kindly. To know when it is steeped enough, a grain is to be taken out, and held end-wise between the thumb and fore finger, pressing it gently. If it be hard and stubborn it is not enough. When it is in right order it will yield a little; there will be a softness perceived in the floury part or body of the grain; and the husk will start or part a little from it.

The hitting this time is the nicest part of malt making: if it be not steeped enough it will not answer well in the rest of the process; and on the other hand, if steeped too long it will lose its flavour. When the barley is in this right condition, the water is to be drained from it, and it is to lie to come on the floor: this it will do in a little more than twelve hours, in favourable weather: but sometimes it will be twice or three times as long. From the cistern it is to be put into a square hutch, and there to lie about thirty hours. Then it is to be worked night and day, in one or two heaps, as the weather is hot or cold, and turned about once in six hours, the outer part inwards, and the bottom upwards: always keeping a clear floor, that the corn lying next it may not be chilled.

This care is to be continued till the malt begins to spire, or, as the expression is, to come: after this it is to be turned once in three or four hours; and as it comes more the heap must be spread thinner, to cool it. The best method is to lay it out in general in parcels two foot and a half thick, and about ten foot broad, to come and chip gradually. When it is come enough it is to be turned once in two hours or less, for four and twenty hours together; and when it is fixed, and the root begins to be dead, the heap must be thickened again, and often turned and worked about, that the growing of the root may not return. A diligent man is to be employed, and he should be without shoes for fear of damaging the malt. He must turn it frequently, and keep a clean floor: otherwise the malt will either mould or shoot out in leaf. This last is the most common accident, and it is what the malsters call *acrospiring*. In this case the fine flour of the malt is exhausted in this useless shoot, and the rest is a kind of chaff.

When the danger of both accidents is over, the malt may be put into the kiln; but a better way is to throw it up into a large



large heap first; in which, being in no danger of shooting, it may lie twelve hours, this will mellow it in a surprising manner. After this it should be spread and turned once in six hours, and this repeated four times. The weather is a great article in malt making, and its changes make so much variation, that no fixed rule can be established. Twelve hours is about the time it usually requires to mellow in this heap, but sometimes an hour or two less, and sometimes an hour or two more will be better; this must be tried by examining it: if it heat too fast it will be greasy. The other times of turning must also be varied according to the temperature of the air. The farmer sees what is the design of the work, and he is to turn it an hour sooner, or later, according to the opportunity. If he make his malt himself this is a very material part of knowledge, and, if he do not, it is fit he should understand the process, that he may know whether those to whom he puts it to be made, do him justice.

When the malt is in the condition we have named, it is to be brought to the kiln to be dried.

## C H A P. II.

### *Of the drying of malt.*

**T**HERE are various degrees of drying malt, according to its intended use; and different contrivances for the doing of it. The paler the malt is to be, the more gentle must be the drying: but in this there is a great deal of variation. The palest malt will require ten hours or twelve in drying, whereas the brownest will be very well dried in four, and a middling kind in six or seven hours.

There is a dispute among malsters, about the thickness the malt should lie upon the hair cloth for drying. Our ancestors spread it very thin, they rarely let it lie at more than three inches deep: our late improvers, as they call themselves, lay it six inches or more; but this is a great error. About four inches is a proper thickness: in this manner a space of fifteen foot square will dry two quarters of malt. It is not to lie all the time quiet. It must be turned upon the hair cloth as upon the floor, more or less, according to the nature of the fire, and the time intended to be allowed. If the fire be gentle, and 'tis a pale malt, that is to have ten or twelve hours on the hair cloth, once in four hours is very well for the turning: if it be a kind that must dry quicker, once in two hours will be a proper method: observing to keep a clean bottom.

When the malt is sufficiently dried, it must be thrown off  
from



from the kiln to the floor, and spread thin and wide in an airy place, that it may cool. Then it is finished and fit for use.

There is not, in all the common arts of life, any that requires so nice a caution as the making of malt. The time must be considered: three weeks is a moderate allowance, often it will take much longer. As different lengths of time are required for drying malt, there have been invented various ways of doing it. The iron-plate frame, and the tile frame, both full of small holes, are esteemed by many; others prefer the brass-wire and others the iron-wire frame; and others the hair cloth: the husbandman is not to give his voice in favour of any one of these in general terms; but to consider the use it is intended to answer: the nature of the malt to be dried is a material consideration, for that kind will do for one that will not for another; and when the most expeditious can be used, without hurt, there is something in the saving of fuel. Those which do with the least fuel are the iron-plate frame and the tile frame: they were invented for this purpose, and are a ready and cheap method. They dry the brown malts very well, but they will not answer for the pale.

None of the methods heat the malt so violently as these, the corns often jump like parched pease, and crack: but they get a fine brown. It is a cheap way; but let the farmer see he is not deceived in it, especially if he buy malt of this brown sort. The nature of it is to look dry, and it is not the worse for that; but those who sell it, frequently sprinkle water over it, and this makes it swell up vastly. 'Tis fairer to the eye, but this takes away a great deal of its sweetness.

People find the brown malt dried this way apt to spoil in keeping: but they accuse the machine, when the malsters are in fault: all the damage is owing to the sprinkling water over it; this subjects it to decay in keeping. Brown malt, dried on one of these frames, will keep as well as any, if it be spread to cool as soon as made, and no tricks be played with it. All the damage it is subject to is, contracting something of a bitterness by burning; but this is owing to the carelessness of the maker, more than the fault of the frame.

The carelessness of some, and the tricks of others, have turned these methods of the plate and tile frame out of fashion, but without any real cause. They are fit only for brown malts, but in a fair and proper management they dry these as well as any other of the methods, and much cheaper.

The wire frame comes next after the plate and tile ones, and now is generally used in their stead. This dries the malt  
more



more gently and leifurely ; but there is fome difficulty in the turning it, and cleaning the bottom.

Of all the methods the plain and fimple hair cloth is the beft for the fineft malts. A flow fire under this dries it very gradually and equally, it is eafily turned as is required, and when it is done there is no difficulty in getting it out, for 'tis only turning it at once and all is clean.

### C H A P. III.

#### *Of the fuel to be ufed in drying malt.*

**T**H E R E is a great variety in the article of fewel for malt, fome kinds being cheaper, fome dearer ; and fome better, others worfe. However this is not fo abfolute, but that fome of thofe which are bad for the drying certain forts, may be proper for others.

The principal kinds of fuel are five : 1. Coak ; 2. Welch coal ; 3. Straw ; 4. Wood ; and 5. Dry fern or brakes. What is to be done by this fuel is to dry the malt, and nothing more : no flavour is required from it, and therefore the purer the fire is, and the cleaner the malt is dried by it the better. All fmoak is wrong ; and therefore all thofe fuels that yield a great deal of fmoak, are to be rejected in the drying the nice malts.

Fern is a very bad fuel for this ufe : and at firft fight a perfon might join wood and ftraw under the fame denomination, becaufe of the quantity of fmoak, but there is in this a difference. All fmoak is an enemy to malt ; but there are varieties in the tafte and flavour of the fmoak of different materials. The fmoak of fern is not only plentiful, but of a very ill hogoe, which it will communicate to the malt. And the fmoak of ftraw, though almoft as plentiful as that of fern, is fo fweet, that it fcarce does any damage. The fmoak of wood is of a middle nature.

Dividing our fuel into two general kinds ; the coak and welch coal being the beft, and the ftraw, wood, and fern the inferior : the ftraw is the beft of thefe, the wood the fecond, and the fern worft.

There never can be a neceffity of uſing fern, therefore it ought wholly to be excluded : wood may always be had, and muſt be better than fern ; and for ſome of the ordinary malts it is a cheap fuel, and answers well. Straw, with good management, may be made to do for any but the very beſt and niceſt kinds. With reſpect to the other two coak is the beſt ; but the other is very good.

We adviſe the husbandman to uſe coak, if it is to be had ; but let him ſee that it be good and well made : for otherwiſe  
the



the inferior fuels may do better. Fine coak is made of large pit coal charr'd, or burnt to a cinder. It is to be burnt till all the ill smell is consumed, and no smoak rises; and in this condition it makes the steadiest and the sweetest fire of any fuel whatever. It is a common negligence to char this coal imperfectly, but the husbandman who dries his own malt should examine strictly into it; for one smoaky piece will do vast damage. He may see this by the eye, for there is a particular dry aspect which coak has when well burnt, that is wanting in such as has any of its gross parts remaining.

The next to pure coak is welch coal: this is called by many culm. It is a fine sweet coal dug naturally out of the ground. It comes in thin fleaky pieces, and burns to white ashes with a little flame, and no smoak. This brings it nearer to the nature of coak, but it is not altogether so pure: however, it is cheaper in many places, and for all but the fine malts will very well answer.

Let the farmer, if he have convenience, dry his own malt, for out of this variety of materials it is possible the malster may chuse the worst: in some places it will not be worth while, because every thing must be built for it, and that the farmer may not think this proper, when he has a small family: but in other places most of the conveniences will be ready. In the hop countries the same kiln that dries hops will dry malt; and so on many other occasions; and wherever it can be done 'tis much best at home. As to a little expence, let him consider 'tis a thing for which there is a constant demand. I shall offend the malsters; but I must add, that if he knew their practices as well as I do, he would see more reasons than are here set down for doing his business himself.

#### C H A P. IV.

*Of the right management of malt, and additions to it.*

**T**O have good malt the barley must be in perfect order; and in this respect the sweating in the mow is a great article. Nature intends some such practice in the finishing of all vegetable juices. Apples carried from the tree to the press make a poor raw cyder; and 'tis the same with the barley: as the apples must lie in a heap, the barley must be packed some days in the mow. I have known some farmers to save trouble and time, thrash'd their barley from the cart which they intended for malt; and I have shewn them the effects of their error. The malt has been poor, steely, and hard, and no art whatsoever could brew good beer with it.

Pure malt requires no addition for the making of fine beer,  
but



but fancy or curiosity have led people to make it various ways, and some not amiss. A small quantity of oats are added by some: but 'tis a practice I cannot approve. The first invention of this was owing to a suspicion of the malster. A farmer who had been careful of his malt corn would put in the oats, that it might not be changed: and as a very small quantity answered for that purpose, there was not much harm. But when those who did not understand the reason of it came to put in more by way of an improvement of the drink, the error was soon seen. Oats hurt the malt; so the less of them the better; but so much as will preserve it to the owner, may be done without any great harm.

Others mix beans or pease with their barley for malting. This seems a more unnatural addition, but I have known it answer very well: such a malt well made, and of good barley, will yield a mellow drink than any other. A peck and half of either is enough for five quarters of barley; and pease answer best. The taste and qualities are much the same, but the pease come better, and mix more conveniently.

Though the farmer may make some additions to his malt, he must be very careful that none are made by accident. We have spoken of cleaning the corn, there is no occasion which requires it to be so perfectly pure as this. The seeds of weeds will get in among it, and some are hurtful. 'Tis said those of cockle give the beer an intoxicating quality, and in some places melilot is a common weed in corn. This is a most mischievous addition, for the seed is very ill tasted.

Tho' oats mixed with barley hurt the common kinds of drink, they may be malted alone, and will make a pleasant liquor; what is called oat ale, when genuine, is made of them, and it is a soft and mellow drink.

Malt may be made of wheat, and a very strong and fine kind of drink brewed from it. A fine malt should be full of flour, mellow within, thin skin'd, and of a pleasant smell. A good method is to try it by water. This depends upon the following principle. Barley sinks in water; but malting makes it so light that it swims. To try whether it be well made, let some fine grains be picked out and put into a glass of water. If the malt be mellow they will swim, if but imperfectly made they will sink like raw barley. The corns must be entire for this trial, otherwise the water will get into them, and they will then sink, though ever so good. The lightness in the hand is a good way of trying: and also the drawing a grain carefully across a board; for good malt will mark it white.



## CHAP. V.

*Of the kinds of malts and waters.*

**M**ALTS, supposing the barley to have been equally good, may be divided into three kinds, the pale, the amber, and the brown. The pale has a great deal of time, and a very gentle fire in drying; the amber has a middle degree of fire, and a moderate time; the brown is the quickest dried of all. The pale is the richest, and it sells for the best price: it may be brewed with well water, but the others require such as is softer. The amber is an excellent malt, and the best way of brewing it is with a mixture of hard and soft water. The brown is the highest dried, and requires river water.

The several kinds of malt may be dried with any fuel, because it is only moderating the degree of the fire; but it is always best to give the sweetest to the finest malt. Pale malt should, for this reason, always be dried either with coak or culm, and the first is best. The amber may be straw dried, but 'tis not nearly so well. As to wood and fern they are used in some parts of the kingdom, and custom makes the people relish the beer brewed from such malt; but to a stranger there is a most nauseous taste of smoak in it. The common practice is to brew some one kind of malt alone; but the mixing half brown and half pale, is a way to make a very sound, pleasant, and wholesome drink. Waters may be ranked under four kinds; spring, river, rain, and pond. Spring water is very proper for the pale malts; but let it be such as is pure. There is a great deal of spring water impregnated with various substances, as salt, allum, iron, and the like. All these are improper for the common service of brewing. Some use them indeed for medicinal purposes, brewing drink with them that it may have their virtues, but this is not what we speak of here. We are informing the farmer how to brew good beer; not how to make medicines. River water is in general the best for brewing: but to be in perfection it should be such as is not near the head of the river, because that will be of the nature of spring water; nor near great towns where filth is thrown in: and to be nice in having it in the greatest perfection, it should not be used after great rains.

Clear river water is soft: it is naturally pure, as rising from a spring, and it has been softened by its motion, and by the effect of the sun and air. River water in general takes out the virtue of malt better than spring water; and the difference is so considerable, that one seventh part more malt is required to



make beer of the same strength from well water than from the other.

Rain water is the softest of all; and makes the strongest liquor from an equal quantity of malt: but the beer made from it does not keep well. It is therefore fitter for ales that are to be drank soon, than for beers made for continuance.

Pond water, when pure, is very good for brewing, but where cattle disturb it, and where there are fish it is never clear. In this case it neither makes a pleasant drink, nor takes out the due strength of the malt. When pond water is in its perfection it is of a middle nature between rain and river water: but in places where it is made foul by the before-mentioned accidents, it is worse than any.

## CHAP. VI.

### *Of brewing in general.*

**T**HE malt is first to be ground, and let this be done moderately. It should be only cracked, and shattered in the mill. This is sufficient, for the water will thoroughly take out its virtue; and if it be broke more it will not answer so well in the brewing. Many desire their malt to be ground very fine, thinking it by that means answers better in giving out its strength; but in this case it mixes with the water instead of impregnating it with its virtues: the wort runs thick, and the brewing goes on coarsely.

Let the farmer have his malt ground ten days before brewing. This is most essential to the brown malts, because it takes off the fiery taste they got in their high drying; but it is of great use to all. The ground malt must be kept in a dry place, and it always mellows in lying. The paler the malt the less time it needs lye after grinding. In the London way of business it is not easy to give malt this advantage, because they brew so frequently and in such quantities: therefore the family brewer has an advantage. About eight days should be allowed to the pale malts, and from ten to twelve or fourteen to the brown. The malt thus ground and kept is ready for use, and we shall lead our farmer into the practice, by giving him a general idea of the method in London, where there are perhaps the most understanding brewers in the world.

Four kinds of beer are brewed in London, stout, common butt-beer, ale, and small beer. Stout is the strongest beer, brewed from brown malt; and is sold for forty shillings the barrel, or six pound the butt, from the wholesale cellar. To brew this, the water in the copper for the first mash is made  
heat soon, by pouring in a couple of bushels of husky malt,  
just



just to spread over its top. The degree of heat to be given this is the utmost that the hand can endure, but it must not boil.

When it is in this condition the fire must be damped, and the best way is by throwing on a good quantity of fresh coals. Then cold water is to be let in till the whole is just blood warm. The malt is then to be worked in with oars, half an hour, and this is called the stiff mash. While this is beating up more water is to be boiling in the copper. This is to be let in: and the whole being mashed again, and well mixed, some baskets of malt are to be thrown over it, and it stands an hour. At the end of this time it is to be let out into the under back; and is then boil'd an hour and half. This, with the due quantity of hops, is the stout.

The common brown ale, or as they call it starting beer, is made in the same manner as the stout; but a larger quantity is brewed from the same portion of malt. After the stiff and second mash they cap the whole with fresh malt and boil it an hour; and after this small beer is made of it. The difference between brown beer and brown ale is only that less beer is made, and it is boiled longer and has more hops, proportioned to the time it is intended to be kept. The pale beers are brewed in the same manner, only pump water is used, and it is made hotter at first, and lowered to be almost cold afterwards.

The small beer in London is made thus. They heat the first water with some hully malt over it, and when it is of a due heat they let in some cold, and run it into a tun milk-warm. The malt is mashed in this; and then the second quantity of water is let in, which is scalding hot. It is to stand an hour, and then be run off into the under back. This makes one copper of the first wort without putting any fresh malt in. The next liquor is to be blood-warm, then hot, and then lastly, cool.

This is the great secret of the London brewing. Their beer has a great advantage from the quantity that is brewed together; and there is a great deal of art in putting in the first water blood-warm, and the rest hot: for this warm water opens the malt beyond any other practice, and makes it ready to receive, and yield all its strength to the hot.

The allowance for stout beer is a quarter of malt to one barrel; and this is sold from the tap at thirty shillings. The proportion for the common brown ale is a quarter of malt to a barrel and half. For entire small beer the allowance is a quarter of malt to six barrels: tho' some allow a quarter to



five. The allowance for pale and amber ale is a quarter to a barrel and a firkin.

Thus have we laid before the country farmer the general proportions and method of working in the London brewhouses for their various kinds of drink ; and from this and the particulars of the several kinds premised before, he will be able to comprehend the whole theory, art or mystery of the business, and may safely and successfully enter on the practice.

## C H A P. VII.

### *Of brewing for a private family.*

**T**O speak in a determinate manner, we must establish some regular quantity intended to be brewed ; and some certain size of the vessels. We will suppose the farmer has a copper, which, when filled to the top, holds a barrel, that is, six and thirty gallons ; and we will say he is to brew five bushels of malt. He has this in the house, it has been ground a proper time, and there is nothing to be done but to put to it the water proper for its kind. Let the water be set on in the copper, and when it is pretty hot pour upon it half a peck of malt. This will keep in it spirit, soften it, and purify it, and make it heat regularly. When it begins to boil ladle it out into the mash fat, and there let it stand about a quarter of an hour.

It is often the necessity of the farmer to use but indifferent pond water in brewing. In this case let him pour half a peck of bran upon it instead of the malt, and when it boils skum that off. It will take the worst foulness of the water with it ; and is to be given to the hogs. In the other case, when the water is tolerably pure, the malt is to be used, and is not to be scummed off, but to be ladled out with the water.

When it has stood about the time mentioned, the steam will be but little, and the farmer may look down into it and see his face in it. This is the country rule, for he cannot see it while the steam rises thick. Separate half a bushel of the malt, and let the rest run slowly and leisurely into the liquor when it is of this warmth ; let it be well stirred about as it runs in, and thoroughly mixed when all is together.

It is a common practice to beat and stir up the malt in this first mash into a hasty pudding, but this is wrong : the whole brewing always succeeds better when it is only well mixed together without such beating. It receives the hot water the more freely, and gives strength to it in a fine manner. When the malt is thoroughly soaked, the hot water is to be ladled on by bowls full, and it is to be suffered to run out at the tap in a small stream, not thicker than a straw. In this manner,



the liquor will run off clear, and will yet have the full strength and true flavour of the malt, according to its kind; and will much sooner be fine than in the common way.

This is the method when the farmer is for brewing good ale, and will make his small beer separately, or less regards it: but when he minds the small as much as the strong, the second copper of water must be poured on quick, and suffered to run off in a large stream. This will make a good bodied and well tasted strong beer, and yet there will remain in the malt virtue enough for the small.

When the first stirring of the malt is done, let the half bushel that was saved out be carefully spread over it; and then let some sacks, or other covering, be laid upon the tub to keep in the steam. The whole is to stand in this way about two hours and a half, and in that time the second copper of water is to be made boiling hot. This is to be poured on either briskly or slowly, according to the design of more or less small beer; and when it is in, let as much run off from the tap as will very near fill the copper. Put half a pound of fine sweet hops in a canvas bag, and throwing them into the copper boil them half an hour: then take them out; and some fresh ones are then to be put in and to boil half an hour. The quantity of hops must be greater for beer, and less for ale.

If the beer be intended for keeping, half a pound of fresh hops should be put in every half hour, and the whole boiled briskly for an hour and an half. While this first copper of wort is boiling, some scalding hot water must be poured in upon the malt, bowl by bowl; and thus so much is to be got in and suffered to run off again, that there may be the quantity of another copper ready for boiling, by that time the first quantity is boiled off.

When this is drawn off the second running must be put in and boiled an hour, with nearly the same quantity of hops as at first; and while this is doing, preparation may be making for small beer, by pouring on such a quantity of water as the farmer chuses cold upon the grains all at once, or at twice. This must be boiled in the copper in the same manner as the ale wort, and must have the hops that were boiled before. Each copper of the small beer should be allowed an hour in boiling. In this manner five bushels of malt will make the farmer a hoghead of ale, and the same quantity of small beer; or if he chuses otherwise, his ale will be much the stronger and better. Each copper of wort must be strained off through a sieve, and cooled in four or five tubs. If he chuses to make it stronger, and for keeping, he must boil off only the one first



copper for ale, and the rest all for small beer; which in that case will be of a very good strength.

He will see that in this method, although very different from the London brewer's practice, yet all that is valuable in that art is preserved. He may imitate their methods, by putting in more malt after the second mashing; and thus running off, according to his pleasure, a larger quantity of strong or of small beer: but this is getting into a confused and perplexed practice. The other is plain, familiar and easy: and we may affirm upon repeated experience, that whosoever follows it, will brew to his satisfaction.

### C H A P. VIII.

#### *Of the advantages of brewing at home.*

**W**HAT we have proposed to the farmer we recommend to every middling family. The difficulty is nothing: the time required is only a few days in a year, and the inconvenience not much: the advantages are very many. The saving in money is near half in half; and the housekeeper is sure that nothing but wholesome ingredients have gone into the liquor, which he never can pretend to know if he buys it of a brewer.

Most people have been desirous of brewing at home, but they have been deterred by their thinking there was some mystery and secret in doing it well; and that there required a great deal of room, and a great many large vessels, for the brewing a moderate quantity of drink. We have shewn this to be an error in both respects. The secret is in a manner nothing, a few plain words have described it; and in the method which we have laid down, a moderate copper, and a few common vessels answer the purpose of brewing a couple of hogshheads.

Let cleanliness be observed in every thing relating to a brewery. Many who brew at home, find their beer contract ill tastes, and grow bad after a little time; they little suppose how much this may be owing to the carelessness of keeping the brewing vessels. In families where the brewing comes seldom, the utensils are laid by carelessly; and they grow mouldy or musty. When mouldiness is seen, there is a natural caution for the cleaning it away; but there will be mustiness when there is no mark to the eye.

Whoever intends to brew at home, must look carefully himself into this article. Let a copper of water, or two if needful, be boiled several days before the brewing: let the smaller utensils be boiled in it; and the larger be well scalded with it. Let them all be thoroughly cleaned after the scalding, and then



then scalded again: after this let them be exposed to the sun and air, so as to bleach and perfectly sweeten, but not so as to crack them; and after this let them be set by for use. If every thing be thus conducted, the malt suited to the intended kind of liquor, the water to the malt, and the quantity duly proportioned: if the working be carefully heeded, and the vessels clean, there can be no doubt of the whole succeeding to credit and entire satisfaction.

## BOOK XI. PART II.

### *Of CYDER.*

#### INTRODUCTION.

**W**E have gone through the natural and artificial products of the farmer's stock, and might here close that part of the undertaking: but as the husbandman should never be without an orchard, and we would have him make every part of his ground turn to account, we shall advise him to make cyder from the produce of his apple trees.

Under this head we have an opportunity of communicating to the publick a method, of raising this British liquor to an excellence which renders it equal in value to many wines. This we receive from a clergyman; a gentleman of knowledge and candour; and we have authority to assure the publick, that it contains nothing but the result of experience.

We shall prefix an account of the usual way of making this liquor. Those who chuse to practise the old method, will have full directions; and those who shall attempt it upon the rules prescribed by this correspondent, will, by having gone through the other account first, perfectly understand every thing mentioned in this.

To trace this subject from the beginning, we must instruct the farmer to plant his orchard rightly.

#### CHAP. IX.

##### *Of chusing a spot for an orchard.*

**A**LL we direct the husbandman to practise is, with a view of profit: his orchard we do not look upon as an ornamental, but useful part of his ground: and far from limiting it to the trifling services of the fruit at his table; we intend it as the source of considerable advantage in cyder. If the husbandman finds an orchard upon his farm, tolerably planted, and in a good state of growth, he is to make the most of it as we shall direct: if there be none, let him plant one; if he be



fixed for a continuance : and let the land owner never omit that article.

The first consideration is the choice of a proper piece of ground. It is a plantation that is to continue a great while, and may be of very great value, it is therefore worth while to be careful. 'Tis most convenient to be near the house, for the advantage of gathering the fruit, and for its safety from their being stolen. Different grounds suit different fruits ; and if such a soil as is suited to the kind intended to be raised be not first chosen, all the expence and care that shall follow will breed only disappointment.

Trees root deep ; and accordingly let the husbandman extend his regard to the nature of the ground, farther than to the surface. Of all soils for an orchard intended for cyder apples, there is none comparable to a firm, rich loam. As to what lies under it, let the husbandman see it be not a cold tough clay, nor a perfectly barren gravel. Any other bottom will answer. In the case of a tough clay bottom, the roots will always be chilled, and the branches covered with the moss : in case of the barren gravel, their barks will crack or peel, and the top branches will wither. The depth of the good soil is a material article, for trees spread out multitudes of roots sideways near the surface ; and the extreme parts of these will fill all the good soil be its depth what it will : it is therefore of the utmost importance that they be well supplied with nourishment.

The next article to the soil is the situation. An orchard should neither lie on a flat, nor upon the steep edge of a hill : if it lie in a flat the roots will be chilled by too much wet, and it will want sun and air : and on the other hand, if the descent is too great, little wet will lie for the furnishing the roots, and the best part of the soil will be washed away. The proper piece of ground is one that has a gentle rising : here the sun and air have free passage among the trees, and enough wet will lie for the benefit of the growth, but not enough to do hurt.

If the farmer can find near his house a piece of ground that has a gentle ascent, where the soil is a rich, deep loam, and the bottom neither is a cold clay nor a bare gravel, he is happy in a piece for the plantation. There are advantages of shelter, and openings to the milder air, which that piece of ground is always to be valued that has ; and as this may always be given by a proper plantation, let him be sure, that if nature has not given it, his care and industry do. The north and north east winds are those which will be most mischievous in the spring, and very frequently a north west in a more advanced growth



growth does great damage ; therefore let him plant in such a manner that the trees be perfectly defended from these quarters, the north, the east, and the west ; let it be open to the south to let in the sun : and when all that is hurtful is blocked out, and all advantageous admitted, the growth will fully prosper.

The trees planted to defend the orchard will grow up with the others, only let the farmer be careful not to run into one disadvantage by avoiding another : his orchard is to be defended, but it is not to be blocked up. While the winds are kept off, there must be a clear and free passage for air : this is to be obtained by planting the trees intended for shelter at proper distances, and trimming them as they grow ; leaving on branches enough to break the hurtful winds, yet not so many as to choak the passage of the air. The fruit trees themselves must be planted also with a careful regard to this advantage.

#### C H A P. X.

##### *Of disposing the orchard.*

**W**E now enter on a point less understood and worse practised than any thing in the husbandman's profession ; but we shall endeavour to lay down such rules as will lead him into a better tract. A free passage of air is of the utmost consequence ; it must have liberty to go briskly between tree and tree, and to carry up all damp vapours with it, else they will destroy the hope of the planter. Let him first take care of this in planting for defence. If there be rising grounds towards the north east and west, they will defend the orchards without other help ; and when they are wanting, let him plant trees for this purpose far enough from the fruit trees, that they be not choaked up by them.

The same caution is to be observed, that the fruit trees do not choak one another. Most orchards are planted too close. The desire of having a great deal of fruit upon a little ground is the cause of this, but the method they take defeats the purpose. They do not consider when a tree is planted to what an extent its branches will spread, or how far its roots will run. Let our husbandman take care of this ; let him give compass for the roots that the trees do not starve one another, and free air room for the boughs, that there may be clear space enough between those of the several trees at their utmost growth for a passage of the sunshine and winds.

We have, on other occasions, spoken of the great folly of close planting, but in these trees it is worst of all : they spread farther, and they are to stand longer than others, so that 'tis an error not to be remedied. Of the orchards in general in  
most



most parts of the kingdom, if the trees were but half as many, the fruit would be a great deal more. The natural vapours of the earth being pent up occasion blights: but that is not all; the perspiration of the trees is very great, and that joined with the vapours from the earth, will at the same time hurt the growth, and give an ill taste to the fruit: the sun is a very essential thing for the raising a cyder apple to its right flavour, and that is not to be had where the whole is kept in shelter by the covering of the boughs.

The husbandman who has an old orchard should thin it by cutting away a great deal of the heads of his trees, but in the planting a new one, another sort of caution should be used, for it is better to prevent than remedy. In the common way of planting all the ground is lost for other purposes; whereas, if the trees be set at great distances, it may be tilled, and will produce crops; and these, far from impoverishing the trees, will, by the culture of the ground, cause them to grow quicker, to flourish more and to last longer. We have explained the vast advantage of tilling the ground while a crop is upon it. This is a benefit trees will share in common with other growths; and what we are now proposing is in all respects the raising them by the horsehoeing husbandry. The slight rooting crops of corn sown in the ground between them do them very little harm, and the breaking and dividing the land by tillage for these crops enriches them prodigiously; so that the advantage is many times greater than the damage.

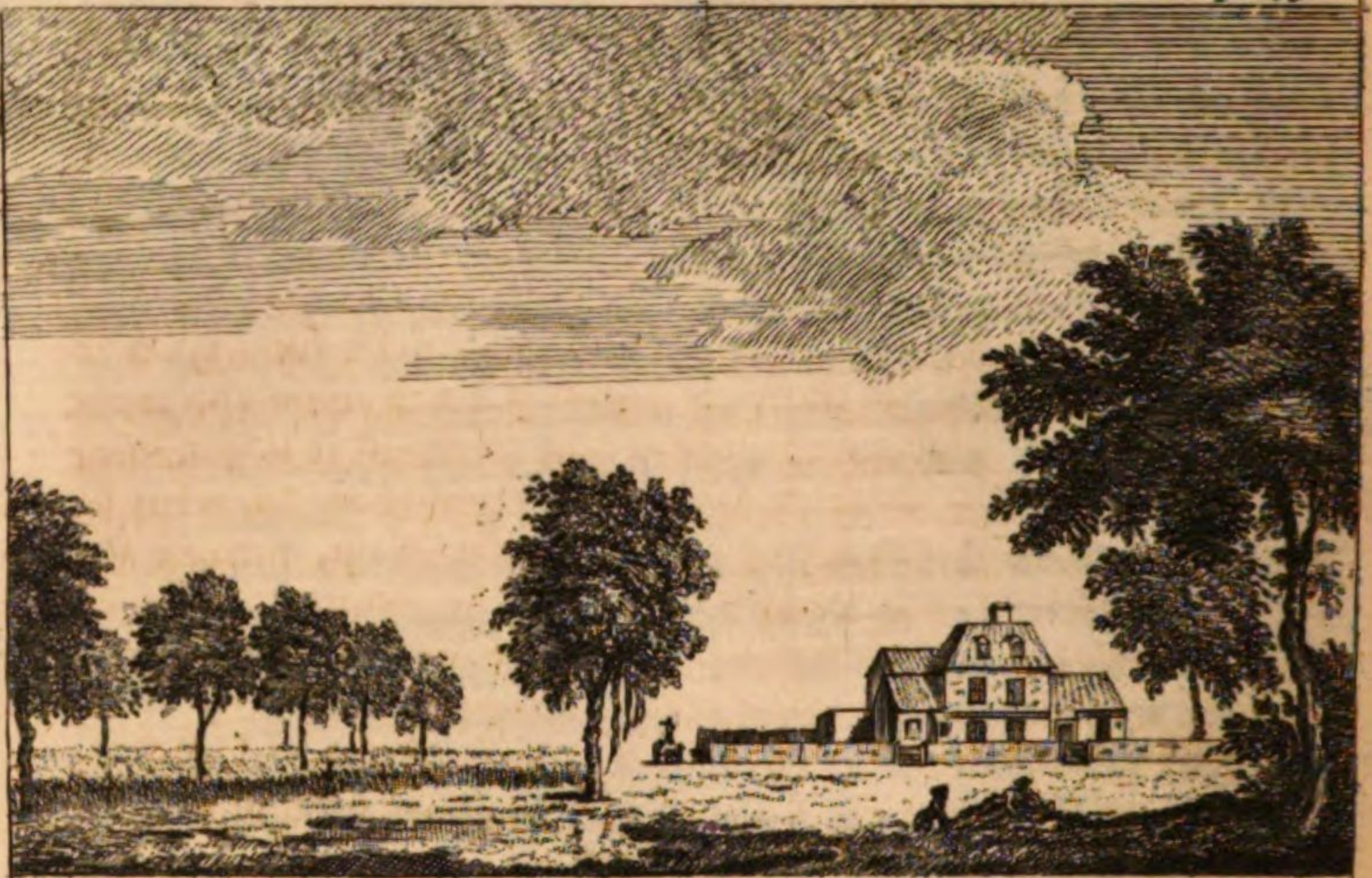
This then is the plan upon which we advise the farmer to begin his plantation. He has chosen a piece of ground, it is defended properly, and yet open to the best influences of the air. All this serves for the advantage of the corn as well as the trees. Let him consider the piece therefore as a quantity of arable land as well as an orchard. He must sow upon it none but the shallow rooting crops, as corn, the pulses, and the like: for the others would interfere with the main design. His ground being chosen, let him make a plan of it upon paper, and mark the places of his trees. Let him dispose them in regular rows; and let these rows be thirty yards asunder; and the trees twenty yards from one another in the rows.

Such a plantation will have all the advantages an orchard can enjoy. It will bear as much fruit as it will be possible by any art to obtain from an equal quantity of ground; and the farmer will have the benefit of it as so much land like the rest. In the first year every foot of it will bear as well as any other ground; and when the trees are fully grown, he will only lose the advantage of a small spot round each, which it will be prudent

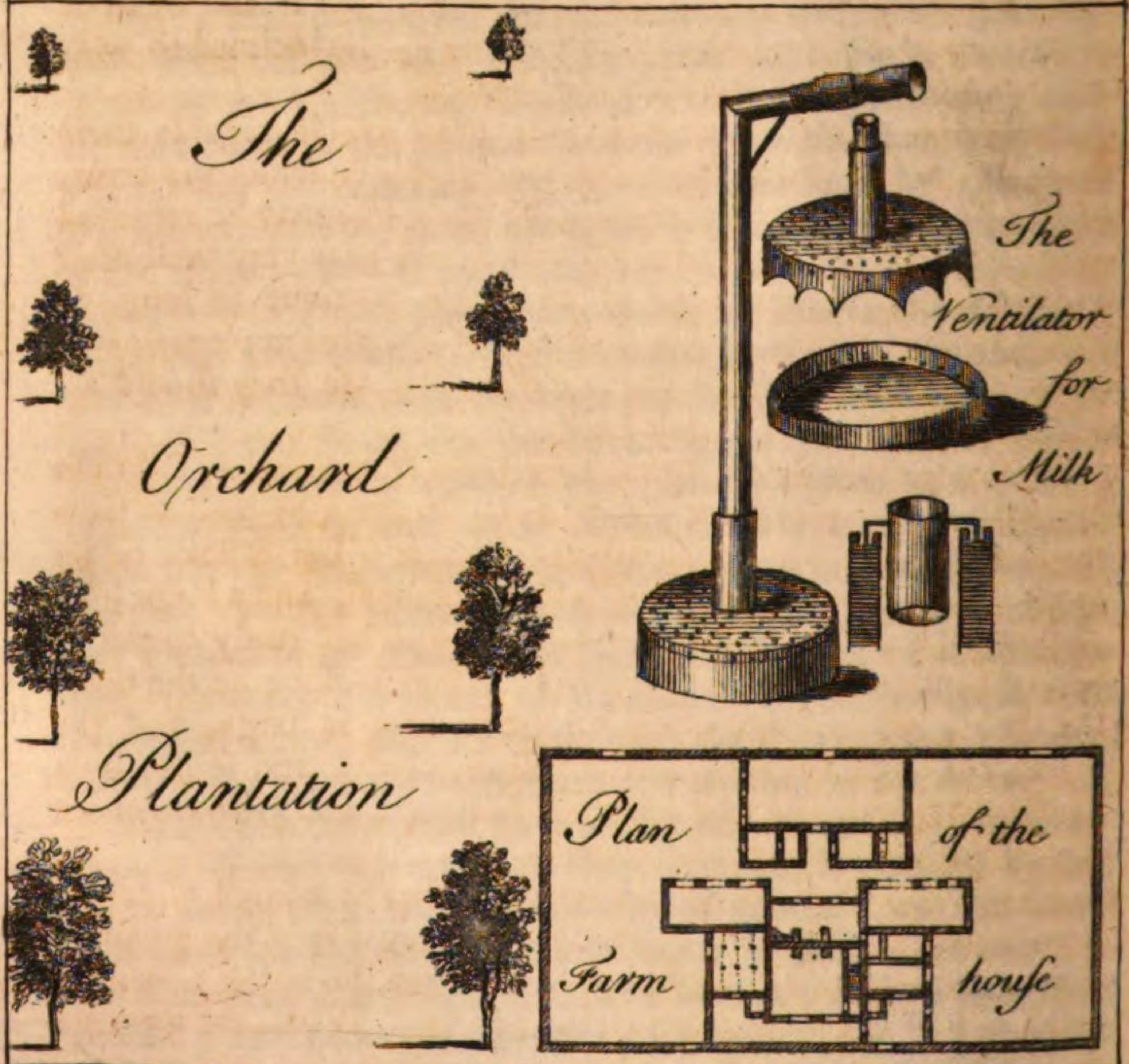








*An Elevation of a Farm House, with the Orchard Planted at Distances and the Ground Cultivated between*



*Compleat Body of Husbandry*



dent in him not to sow: the ground will all bear, except just under the shadow of the boughs.

C H A P. XI.

*Of making the plantation.*

**W**E will suppose it spring, and the ground he fixes upon to be in pasture: let him not count so much upon the profit of the summer's grass, as to defer the work till it is got in or eaten off; this is a small advantage in proportion to what he is about. Early in the spring let him plow it up, turning the turf in that it may rot. Three times in the summer, let it be plowed over again, to break and divide the soil, to tear the turf to pieces, and to prevent the growth of weeds.

The last of these plowings should be toward the end of September; and this should be very deep, that the ground may be prepared for the reception of the trees.

There are two seasons for planting the trees, and the farmer should be guided by the weather and the nature of the ground. If the soil be dry, and the autumn favourable, any time in October the trees may be put into the ground: but if the weather be extremely rainy, and especially if the soil be inclined to wet, the best time is the second week in March.

As to the choice of the trees, the great article regards their age: for in this many have run into a very mischievous error, by the planting them too large. An apple tree may be removed when of a considerable growth, and it will bear very well after it; but it will neither bear so well, nor continue so long, as when planted young. The best age of a grafted apple tree is at three years from the grafting; and for this use they should always be chosen upon a crab stock.

Let our farmer by no means take them from a better soil than his own: if he can have his choice, let them be such as have stood on a ground like his, but not so rich. Let a stake be set up at every place where a tree is to be planted, and a large hole opened; let the earth be well broken, and laid ready to put in when the tree is set. A great deal of hurt is done by the holes not being made large enough: when that is large, and the ground is well broken, and spread regularly, and settled by a gentle watering, the tree roots itself at once, and grows without any visible check from the moving.

It is best to buy the trees from a nursery at a small distance, that they may not suffer by being kept long out of the ground: the more expedition is used in planting them the better; for they get harm by the air coming to their roots. When the trees are brought into the ground, one is to be laid by the side of each hole:



hole ; and both the roots and the heads are to be pruned before they are put in : the best way is to prune the roots as the tree lies, and the head as soon as it is planted : the treading about the roots in doing this afterwards, and the gentle shaking it gets in the handling, help to fasten and settle the roots, and the watering coming on upon that compleats it effectually. In the pruning the roots the first care is to look if any be bruised ; such are to be cut off a little above the bruised part : then let the manner of growing of those which are left be examined : if they cross one another, one of the two must be cut off just above the place. When the larger roots are thus regulated, the fibres must be pruned. These must have their ends cut off ; and it should be done just before the putting them in the ground.

All being ready, let some of the fine broken mould be scattered in the bottom of the hole, and the tree set on it perfectly upright, and not too deep : then let the rest of the mould be thrown in a little at a time, and the whole laid level and smooth at the surface.

The head is the next care. In old time gardeners were afraid of taking off the smallest shoot from a new planted tree : at present the fashion is opposite ; the gardener with his knife is as terrible as the surgeon with his instruments ; and he thinks the more he cuts away the more he shews a masterly hand : both extreams are wrong. Indeed what extream is not ! The tree will not be able to support so large a head at first, as it did while in the native ground ; but if some be not left on, it cannot thrive. He is to take off a part, and to manage his knife in such a manner, that what is left on may form a well shaped head.

When the tree is planted upright, and reduced to a proper shape in the head, it is to be secured from damage by staking. To this purpose a strong stake having been driven down near each tree, the stem is to be tied to it with a hayband. The husbandman is to till the ground between the trees. They will grow without his care if the seasons favour them ; if not it will be proper for him to water them at times, both the first and the second year.

Let there be a good parcel of turf pared pretty thick from a common, and laid down by the foot of every tree. The turf part downwards. This needs not set aside the use of watering, for it will make it answer much better, because the moisture will be detained as long as it ought ; and this turf may be afterwards dug in as a manure. This kind of plantation we shall explain in a folio plate, at the close of our directions concerning cyder.



CHAP. XII.

*The general or common method of making cyder.*

THE apples intended for cyder must be picked clean, heaped, and their juice squeezed out. The picking them is an easy as well as a needful article; no filth or foulness of any kind must be mixed with them; and if there be any decayed ones they must be thrown away. The picked apples are to be put into the mill, where they are mashed and ground to pieces: this is the proper method for large quantities; but any bruising and squeezing them thoroughly will do. The juice squeezed out, is to be caught in vessels, and as some foulness will have come among it, it must be strained. A hair sieve answers for this purpose, or a canvas bag, or any other contrivance that will let the juice run through; and keep back the gross particles.

The juice strained from impurities is to be put into a vessel, which must not be quite full. It is to be covered loosely, and set quietly by for three days. Then it is to be covered up as closely as may be with clay; and the business is to watch for its growing fine. This is to be known by trying from time to time. A small quantity is to be drawn out once in a day or two, and examined: when it is sufficiently clear, it is to be pierced for a more certain examination of the whole.

The farmer is to consider his cyder according to the nature of the apples under three kinds. 1. The summer fruit cyder; 2. The gennet moil cyder; and 3. The redstreak cyder. These have their three several times at which they may be naturally expected to arrive at this degree of fineness: the time of the summer fruit cyder is about a month: the gennet moil cyder seldom comes to it till toward the beginning of October; and the redstreak kind not till January.

These are not certain rules, for there can be none such. The weather, the temperature of the air, and the degree of ripeness of the fruit, will make great variations. The winter fruits are to be expected to answer in the manner of the redstreak, and when after a month, or at the utmost six weeks more than the usual time, they are not grown fine, they must be racked off in the manner of wine.

Many expedients have been used to fine down cyder that does not answer, but most of them are very improper. There is however one eminent ingredient, that is of excellent service to this purpose, and may be used with safety. This is isinglass. It is a harmless drug, and when dissolved is of such a clammy quality that it lays hold of all kinds of foulness; and when the fault is not too great, will leave the liquor fine. Isinglass is brought



brought from the northern parts of Europe, where it is made by boiling the sinewy and skinny parts of a fish, like a sturgeon, to a jelly; which is then poured out upon a table to dry. The large lumps are very hard to dissolve; but when it is beaten out into thin shivers, it will melt without difficulty.

Water dissolves it, but that will impoverish the cyder; and any thing that weakens a liquor of this kind, naturally renders it cloudy. The best way is to dissolve the isinglass in a good bodied white wine.

It will be fit for use as soon as it is thoroughly melted, but not before; this is done slowly: some hasten it by heat; but that is not so well. If the wine and isinglass be set over a gentle fire, and kept stirring, it will in some little time melt; but the wine loses a great part of its spirit, and often the whole gets a burnt taste. The better way is to take a proper time, and let it dissolve in the cold. The fine beaten isinglass is to be put into a large bottle, two thirds filled with wine; and set by in a cellar. It is to be shook gently from time to time, and by degrees it will perfectly dissolve, and the whole will make a fine jelly.

When the cyder is made fine by an innocent addition, or when it has, in the common course of time, become fine of itself, it is to be drawn off at pleasure and bottled, if the farmer chuses. This is the common rule for making cyder; and, this being premised, we shall give the reader the new improvements of the gentleman we have before mentioned.

1. In the improvement of cyder the first rule to be observed is, that all the apples be permitted to drop from the tree; that they may have the full benefit of the stock on which they grew, and of the sun: for by striking down the fruit before it is ripe, the buds are broke off with it, the tree is injured, and the cyder that is made is harsh, for want of time to meliorate the juice.

2. Let the apples (especially in windy weather) be gathered up once or twice a week, and thrown together in some secure place without doors; for hoarding the fruit in a house is apt to give the juice a musty taste: it also prevents the cyder from quick refining.

3. Let your apple heap be made on slanting open ground towards the south, that the falling rains may run from it, and that your fruit may be exposed to the sun.

4. To erect a slight covering of reed over the apple-heap, supported by four tall sticks, will be very proper; the fore and higher part fronting the south. By the shed so contrived and situated, your fruit may at once have the refreshment of the air, be defended from rain, and be visited by the sun. But let the bottom of the apple-heap be covered, or paved with broad stones, and



and edged round with the like fort, to keep the fruit clean and close together.

5. Let your apples lie in the heap a longer or shorter time, according to the nature of them. Mediates, being of a hard kind, and their juice austere, require a month in the heap, or more: whereas white-fours, being of a softer sort, a fortnight or less for them may be sufficient. But the time for each must be proportioned to the ripeness of the fruit, and to the various dispositions of the air and weather. For, according to the quality of the fruit, and the temperament of the air, the apples run sooner or later to decay.

6. When your apples are pounded, let the muck lie a day before it is squeezed. It will improve the colour of your cyder.

7. If you make a tun of cyder at one time, and have a vessel large enough to contain it all, it is a good way to keep it together: that it may all become fine at the same time, and be fit for racking.

8. When your cyder is fine, (which it sometimes happens to be within a day or two, especially upon a dry, northern, or eastern wind) then, by a cock placed within half a foot of the bottom of the vessel, always allowing room for the dregs to settle in; it must be racked off into hogsheds. But although cyder be racked never so fine at first, it will ferment again and become foul, especially in rainy and tempestuous wather, and upon southern and western winds; and then your cyder may require several rackings before you give over your care about it: for all wet seasons are injurious to new cyder, by causing a constant fermentation for a month or six weeks, and longer, if the rough winds and foul weather so long continue. You must therefore be very observant of them, and watchful against them, by frequent racking, whether your cyder be fine or not; in order to prevent its over fermentation.

9. Let this be a standing rule for your first racking: namely, to set about it when the thick, red head, or crust, which covered the cyder, begins to separate, and white bubbles appear. For although your cyder be foul at that juncture, it is yet proper to rack it: otherwise your cyder may become incurable: for it will then (especially in wet weather) instead of a gentle fermentation, be put upon the fret, and in the South-Ham phrase sing; the notes whereof may be heard at a considerable distance, till it becomes pale, thin and languid; and hath sung itself to death.

10. To prevent waste in racking, and, at the same time, to dispose cyder for becoming fine the sooner, recourse must be had to straining. Get flannel enough for five or six bags, each containing six quarts. Let those bags be made of a conical figure,  
like



like a sugar loaf. Let the small ends of these bags hang downwards, that the cyder, by its weight, may the sooner be impressed through them. Let the upper and open parts be edged or bound round with inkle; that they may the better support the weight of the liquor.

11. When your bags are prepared, get a strong hoop, and having fastened two sticks across in it, tie up your bags to them. The center where the two sticks meet, having a rope fixed to it, and the bags being made to hang perpendicular over a large vessel, pour that cyder into them, which remains at the bottom of each hoghead after racking; and which is too foul to be mixed with the rest. By this method abundance of cyder, and fit for common use, may be preserved, which must otherwise have been thrown away with the lees.

12. An empty hoghead must be kept for the reception of the strained cyder, into which it must be poured from time to time, as soon as it is strained. The cask must be closely bunged, as often as the cyder is put into it, lest the liquor become flat by being too much exposed in an open vessel. This cyder must also be racked, when there is a good quantity of it together, and it is become tolerably fine.

13. To adapt your cyder to all palates, you may, either at your last racking, or just before you bung and stop it up, mix several sorts together, and so render your cyder rough or mellow, to what degree you think fit.

14. By thus mixing your cyder, you may give all that you intend for your own table, the agreeable taste of the white four. The juice of this pom-royal being of such a predominant quality, as to communicate its flavour, in a very distinguishing manner, to all the cyder with which it is in any due degree mixed, providence seems to have ordained it for this very purpose. I know, indeed, that in the parts about Modbury and Kingbridge, in Devon, where the white four-fruit much abounds, the people are more tormented with the gout, than in any other part of the county. This they attribute to the use of white-four cyder. But ought they not rather to impute their gouty complaints to their grout ale of several sorts, with which those parts more abound than any other! are not these liquors too foul to have a clear passage through them; and what becomes of their contents? must they not of course rack and torment the bodies that harbour them?

But, if these gentlemen are so in love with their grouty liquors, as not to perceive the mischiefs they suffer from them; (for, of all fermented drinks, those of the grout kind seem to be the worst) if they are resolved to acquit the guilty, let them not

be



be so unfair, as to condemn the innocent. Before they take up arms to lop off the heads of their white-four trees, and to graff them to another kind, it is no bad advice to them to suspend their intended hostilities, and to try the difference, by racking their white-four cyder more, and drinking less of it unmixed. If these tender-footed gentlemen do really find their white-four cyder searching, after they have well subdued it by racking; one hoghead of it will serve to improve two of another sort, and render all three more fit for their tables: for white-four cyder freely communicates its virtue to other juices.

15. Various are the practices of stopping their cyder; some doing it early, and others leaving it open till Christmas, and longer, if the frost be not severe. As I have experienced both ways; I must give my judgment in favour of the latter. But due regard ought to be had to the nature of the fruit, and to the time of pounding: the cyder which is first made, may, at Christmas, be twice as old as the last pounding; coming from a more early fruit, and therefore sooner discharging its windy effluvia, it ought, for that reason, to be the sooner bunged up.

16. While your cyder continueth unstopped, a slight and loose covering of board, which may reach from hoop to hoop, ought to be put over the bung-hole, to prevent dust, and other annoyances, from breaking the thin film, which investeth the surface.

17. Especial care must be taken to fill the hoghead to the very top of the bung-hole, at the last racking; that if any light or flying lees remain in the liquor, they may be removed at the bung: for this is frequently the case of mellow cyder: and if those lees are permitted to remain in it, the surface, by being exposed to the air, will become sour. That tartness will by degrees render all the cyder of the same complexion. Yea, the taint may be perceived to descend gradually: for while the cyder is sour at the top, it is found a few inches below it; till it descends from top to bottom.

18. This is the grand article in which people are wont to be deceived, and by which they are rendered out of humour with racking of cyder, how much soever they are pleased with it, when it happens to answer their wishes. When their cyder turns sour, they imagine that racking takes away the spirit of it, and that it must then become sour of course, for want of a body; as they are wont to speak: whereas, in truth, it grows sour for want of skill how to secure it after the last racking; by removing the light lees which swim on the top, before they acquire the least degree of acidity. If the hoghead is not full, or the bung-hole is not large enough to admit the doing of this by



a spoon, the cyder must be racked again, though it be as clear as rock water: racking indeed is the surest way; for some of the lees may escape the spoon, and therefore there is no certain dependance upon it.

19. Under the article of racking I must observe, that the person employed in racking your cyder, must be particularly careful to wash and dry his straining bags, racking tubs and buckets. He must be as neat in his cellar, as a maid in her dairy. For want of this precaution, as the dairy abounds with four-milk; the cellar is stocked with a despicable sort of vinegar.

20. The season for bottling of cyder for the second year's use, (as that of the white-sour, mediate, redstreak, fox-whelp, and others of the strongest kinds) is at the end of August, or beginning of September: that the remaining heat of the season may give it just briskness enough to preserve it the following winter. Cyder thus ordered will be a prudent reserve against the year of dearth, and stand good for several years: longer, perhaps than the owner's curiosity can prevail over his appetite to keep it.

21. Regard must be had to the difference of climates. My warm situation (for instance) in the southern part of Cornwall, near Falmouth, doth oblige me to defer bottling of cyder till the end of October, or the beginning of November; and even then to let the bottles remain uncorked several days: otherwise (although I do not bottle my cyder till it be two years old) my mellow cyder would burst most of the bottles; and thus I should be undone by the cracking of my brittle ware.

22. My experience this way hath taught me not to fill the bottles higher than the bottom of the neck, even with a rough cyder, and lower still with the mellow sort. Hereby room is left for the subtil and volatile particles to play, and expand themselves without breaking the bottles. As for the experiment of putting a small piece of round cork into each bottle, for prevention of mischief, I never tried it. For if the cork happens to be musty, or the parts of it to be separated in the bottle, it will prove an injury to the liquor.

23. That your stock of bottled cyder may be kept from leakage, the corks must be tied down with strong packthread. The bottles ought also to be laid upon their sides: but care must be taken to decant the liquor with the same depending side downward on which the bottles lay in the cellar, that so the sediment may be left behind.

24. Thus I have finished the ordering of the fruit; to the making, managing and improving of the cyder to the best advantage; and to the rules proper to be observed in bottling of it, and



and in decanting of it, so that it may be presented to your friends at the table in the most elegant manner.

The management of cyder is a secret, which the curious are fond of keeping to themselves. As people have their different and peculiar ways of doing it; and as they are ambitious of excellling one another in this domestick liquor; so, one would think, there was an envy mixed with their emulation, which hinders them from communicating their several arts. They converse freely enough upon the ordering and managing their lands, in such a manner as to reap the most advantageous returns from them. But, amidst their other friendly discourses and communications, they are reserved and wary upon the subject of cyder. Those who have obliged the world with rules for improvement of lands, by the plantation of orchards, and from thence have passed on to cyder, have handled this subject but slightly. Hence it is that that bee of art, Mr. Chambers, hath said little upon this article. Although he ransacked woods and forests, hills and mountains, sea and land, and the universe itself, for honey to stock his hive: yet (for want of other flowers to make a collection from) he is obliged to take up with a single quotation from Mr. Worlidge; and the reader is still to seek for information.

I have for these reasons been the more exact and particular in laying down the rules, and in assigning the reasons of them: insomuch that I think I have rendered every thing clear, plain, and intelligible. For I have penned it for the service of the farmer, as well as of the gentleman; for the use of the poor rack-holder, as well as for his rich and wealthy lord.

The rules I have laid down I have fully experienced, in a course of many years residence in the South-Hams. When others have found as good success in the observance of them as I have met with, by rendering their cyder from fifteen shillings a hoghead, worth five guineas; yea, as valuable as an hoghead of wine (each of which I have actually refused for a hoghead of Cornish cyder) they will, at least think themselves so much obliged to me, as to say that neither their labour, nor my own, hath been ill bestowed. I have received the thankful acknowledgments of many, who have frankly declared, that their cyder, which before used to be thin, poor, and hungry, hath, by their following these directions, proved so rich, full and good, that their friends (especially those who have been bred in the maritime way) have, during the summer season, called for it at table, and preferred it to the best of Port-wine: and they reckon it a valuable article in housekeeping.

But I must be so sincere with my reader, as to acquaint him,  
Z 2 that



that those who have followed my rules but in part, and who have been diverted by a multiplicity of business, company, recreation, or pleasure, from giving a due attendance to their cyder, they have found themselves much deceived in their expectations, when it was too late to amend their fault.

End of the ELEVENTH BOOK.

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C O M P L E A T B O D Y  
O F  
H U S B A N D R Y.

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B O O K XII.

*Of the accidents to which the cattle and their crops are liable.*

CHAP.

1. *Of heat considered in itself, and its effects on the stock and crop.*
2. *Of drought, its nature and effects.*
3. *Of the care of fields in the management of shelter.*
4. *Of suiting the crop to the soil to prevent the effects of drought.*
5. *Of the effect of the drought on trees, and the way to defend them from it.*
6. *Of preserving water for cattle in seasons of drought.*
7. *Of obtaining supplies of water when the common ponds are dry.*
8. *Of the signs and notices of drought to be observed by the farmer.*

CHAP.

9. *Of rains.*
10. *Of the signs and notices of rain to be observed by the farmer.*
11. *Of the several signs of fair weather.*
12. *Of hail.*
13. *Of snow.*
14. *Of winds.*
15. *Of the signs by which winds may be foreknown.*
16. *Of the damage done by winds to husbandmen in their crops.*
17. *Of the nature of blights.*
18. *Of the antient and modern opinions concerning blights.*
19. *Of the real cause and origin of blights.*
20. *Of damages by easterly winds.*
21. *Of*



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|---------------------------------------------------|-----------------------------------------------------------------------|
| 21. <i>Of damages by late frosts.</i>             | 29. <i>Of the prevention of smuttiness by a due care of the land.</i> |
| 22. <i>Of damages from weakness and starving.</i> | 30. <i>Of the prevention of smut by a prudent method in sowing.</i>   |
| 23. <i>Of the nature of mildew.</i>               | 31. <i>Of preparing the seed against a smutty crop.</i>               |
| 24. <i>Of the real cause of mildew.</i>           | 32. <i>Of the cleaning of smutty corn.</i>                            |
| 25. <i>Of the prevention of mildew.</i>           |                                                                       |
| 26. <i>Of the remedies of mildew.</i>             |                                                                       |
| 27. <i>Of smuttiness of corn.</i>                 |                                                                       |
| 28. <i>Of the real cause of smut.</i>             |                                                                       |

### The INTRODUCTION.

AS it has been our custom in this work, not only to inform the husbandman of things necessary for him to know: but to explain them as minutely and exactly as we are able, that by being familiar to his understanding, they might be imprinted in the more lasting manner on his memory: we shall endeavour to prosecute the same method here, though in this case more difficult than any other. There is the more reason for attempting it, because such a knowledge is in no article so necessary. The accidents we are about to treat of are of the most important kind; and if the causes of them be not properly understood, they never can be prevented. For this reason, we shall in the first chapters of this book examine into, and explain to the husbandman the nature of such incidents in the air and elements which are the occasions of many of the accidents; that by understanding in what manner the hurt is done, he may know what are the means in his power, to prevent or guard against it.

Under this division we shall also consider rain, hail, snow, and the rest; and instruct our husbandman how far he may foresee them, and consequently guard his flock and his crops against the danger. After we have enquired into the causes, we shall trace the effects, and thus endeavour to lay down in a few plain words a system of rural philosophy; which if not enough to satisfy the utmost curiosity of idle enquirers, shall yet offer every assistance that has been discovered to serve the practical farmer.

### C H A P. I.

*Of heat considered in itself, and its effects on the stock and crop.*

THOUGH heat be the principle of life in the universe, it may be attended with fatal consequences: the degree determines the utility; that which when moderate is the support and preservation of all things, when excessive is their destruction.

We are not here to enter into the effects of heat in the condition



dition of actual fire, which dissolves, dissipates, or destroys all known substances; but that degree of it only, which may be in the air. The farmer will not bring metals to the furnace, nor expose gold or diamonds to the power of great burning-glasses, which in their full force scatter the one, and split the other to shivers: these are the amusements of philosophy; we are concerned only with its use. We shall confine ourselves to the nature and effects of that degree of heat which is at times felt in the air, and to its influence upon the cattle and produce of the ground: and as we limit this work to the service of the farmer, we shall advance nothing but what stands on certain proof, and what his reason will find it easy to comprehend.

Our island is subject in summer to very considerable heat, when accidents conspire to continue it unallayed. Nature has so well adapted the creatures to this, that they are none of them destroyed; nor the smallest plant, unless irregularly exposed to it: but its effects are very hurtful, though not so great as utterly to kill them. We see cattle fainting and losing their flesh, and plants fading and drooping, according to the degree of the heat; and this the farmer is with his care to prevent, by shade and shelter for the one, and by watering the other.

Many plants, and most animals, bear the effect of cold better than that of heat, for this reason, that the cold only condenses their juices, whereas the heat dissipates them. The effects of this temperature of the air are more sensible on plants than animals; wherefore we shall principally consider them in that light. Many plants will grow in a very considerable degree of cold: but when it comes to freezing, though a multitude keep alive, yet few have the vigour to shoot. The slightest frost stops the growth of most plants, and a degree somewhat stronger stops that of all.

This is a principle perfectly established by experience, and the farmer will learn from it what he is to expect with regard to his winter crop. Young plants suffer more by frost than those somewhat advanced in growth; therefore let him provide for such as are to stand the winter accordingly, and expect from them nothing but what nature will support. Let him sow them at such time in autumn, that they may have some strength before the coming in of frosts; and let him expect little more from them during winter, than to establish themselves well in the ground. What little shoots they can make, must only be during the open weather; and these will be so checked by the return of the frosts, that there cannot be any great progress.

As nature has provided for supporting the generality of perennial plants alive during the coldest weather we have in this island,



island, we are to be under no farther concern on that head ; but to examine the various degrees of warmth and heat ; rising from this, to the extream of what our seasons afford. The warmth of the softer winter months brings plants a little forward ; the gentle heat of the spring makes them shoot apace ; the greater heat of summer ripens their flowers and seeds ; and even the greatest, as we have shewn, is not enough to destroy them, unless the negligence of the husbandman join with it. A gentle warmth puts the sap of plants in motion ; and the greatest power of it within moderation, unites and cements their best juices for the formation of their most useful products : but when we come to a degree considerably greater than this, it operates in a way directly contrary to what we have named, separating and dispersing their best particles, instead of bringing and uniting them together. It is therefore a plant pushes out its flowers, and ripens its fruit or seed in this moderate degree of heat, but in the extream it fades and decays.

Many a crop that might have produced very well is lost, or comes to little, for want of the farmer's proper assistance. Different soils and different situations make plants bear heat differently, some better, others worse ; as also their several kinds. We have told the husbandman what species suit what soils and exposures best, having always kept this article of heat in mind ; and with proper regulation there is scarce any such thing as a crop's utterly failing this account. When we consider how much hotter some countries are than ours, this will appear less strange ; for there are plants which live in the hottest of them.

Experiment shews, that plants will endure without prejudice a greater degree of heat, than that of water made as hot as that a person can but just endure to hold his hand in it without stirring it about. This Dr. Hales proved : he has therefore fixed upon a larger degree of heat than this for the utmost which plants will bear, and ascertains it at that heat of water upon which melted bees-wax begins to harden.

This is an experiment happily chosen, since bees-wax being a vegetable juice, such a degree of heat as would absolutely dissolve that, must be the utmost point plants can bear. This explains to the farmer how much his own neglect is to be blamed at many times, when he gives up his crop as spoiled by heat : this is a degree to which plants never will be naturally exposed with us : therefore he may for his satisfaction establish this maxim ; that if he conduct himself properly in the sowing and management of any crop, it will never be lost by means of heat.



If a weather-glass of the common make be divided into a hundred parts from the degree of cold at freezing, to this degree of heat determined by the melted wax, it will give all the degrees of heat to which plants will ever have any reference. Few houses are without a weather-glass, and the farmers never should. The kind made for this purpose is that called a thermometer, and the husbandman will do well to have one with this division, which will come as cheap as any other. This will shew him at all times what is the degree of heat in the air, much better than what he feels at random by his body; and according to this he will know in what degree of health, or in what danger his crops are from this article. In a space thus divided, sixty-four degrees is about the heat of the blood in animals. Experiments have shewn, that the heat of the external part of the body is that of about fifty-four of these degrees: the heat of milk as it comes from the cow is fifty-five degrees; which is about the same that serves for the hatching of eggs; and that of new made urine is about fifty-eight.

These degrees of heat being known, with respect to the parts and bodies of animals in health, give us a mark by which to know their sickness; and the comparison of what degree of heat our summers commonly afford, with what plants will bear, which is perfectly known by this method, will farther confirm to the farmer what we have asserted already, that when his crops fail, as is supposed by heat, it is not by the absolute effect of that, but by his mismanagement joined with it. The common degree of temperate weather in this division is about eighteen degrees; and the great heats of summer will raise it to eighty-eight. This is a vast advance; it is four and twenty degrees hotter than the blood of animals naturally should be: but even this, tho' without care it will make cattle faint, and expose them to disorders, yet is no less than twelve degrees below the extreme heat that plants will bear without prejudice, if properly managed.

There are countries in which the plants all endure this degree of heat, and more, many months, for several hours each day; but what is seen in them verifies what we have told the husbandman. They hang their leaves and fade, and would be killed by it, but that they are supported and refreshed by the great dews of the nights in those places. Nature has for this reason made many of the plants of those hot regions of such a form, that they have no leaves; these being the part that suffers most readily by the violence of the heat.

Though we have named the height of eighty-eight degrees, as what the weather sometimes arrives at in our summer, the  
farmer



farmer is not to imagine that every summer is so hot; much less that every plant must of necessity be exposed to such a degree. The common heat of a summer day in the hotter months, and in the middle of the day, is about fifty degrees. There is a great deal of difference between this and the heat marked at eighty-eight, which yet is twelve within what plants may bear. But this is a degree of heat to which his cattle are not exposed, tho' a great many parts of his crop are. At those times when the heat is at fifty degrees in the sun, which is to be called a summer noon-tide heat, it is but thirty-eight degrees in the shade. The farmer should carefully observe this article, that he may see what a vast deal is in his choice by a proper management. 'Tis true that the great heats of summer subject his cattle to many disorders; but he sees here, that it is in his power to moderate that heat twelve degrees in fifty by a proper shade.

Motion encreases heat to a great degree, therefore let him take care, that when the days are hottest his cattle are kept the most quiet. In the same manner, as the middle of the day is the hottest part of it, let them be kept particularly still during that time. These are rules founded on plain reason and daily experience, yet plain and obvious they are not sufficiently regarded. The husbandman may, by an irregular proceeding, heat his cattle as much in May, as the nature of the season would do in July: and on the other hand, by proper hours of rest, and due shelter, he may in the effect reduce the most extreme sultry weather to the condition of temperate.

With respect of plants, an observation of the degree of heat, and of their general condition and progress, will shew the truth of what was before asserted, respecting the effect of a moderate heat for promoting their growth, and the effect of a greater degree of it in ripening their seeds. At a medium the heat is in April, at about fifteen degrees. This with the assistance of the rains at that season, sets the plants to shooting. In May and the beginning of June it advances from that to twenty, twenty-five and thirty degrees; and in this time they grow most, and strengthen themselves best. After this come the more extreme heats, and the seed ripens. The degrees of heat between twenty and thirty, are most suited to the growth of plants. The common heat of the beginning of spring, and the decline of autumn, may be reckoned between ten degrees and eighteen; and the winter heat within ten degrees of the freezing point.



## C H A P. II.

*Of drought, its nature and effects.*

**W**HEN the summer months beside being extremely hot are also dry, the farmer's crop suffers greatly, unless well assisted by art. In the hottest countries there are the largest dews; and in our hottest seasons the greatest quantity of moisture is exhal'd from the earth, and serves to refresh the herbs again in its fall; but it is not enough. Nature intended them the assistance of rains, and when these are with-held, the husbandman must supply the defect by his industry. The products of open field land are most exposed to drought, and corn more than pasturage; yet none are exempt. In seasons slightly drouthy the open field corn suffers, and the farmer reaps a poor harvest; and in the extream there is little grass.

The stock suffers by means of the scarcity of food; and there is want of water at the same time. These, added to the disorder of their bodies from the heat itself, are sources of many maladies; so that it is a very important concern to the farmer to make the best provision against the damage that he can, and to do all he can to remedy it when it happens.

The method is pointed out by nature: indeed the husbandman's whole practice is so, if he would follow her steps. Let him ride about the country in the extreams of a drouthy season, and observe the effects of it on lands that lie differently. It is in open fields the effect is worst; and in others he will see the damage less as the enclosure is better. This may shew the proper guard against drought, is by keeping up fences, and planting them well with trees. We before recommended this upon the consideration of its advantage in wood: here is another and a very great one. The effect of the warm sun upon plants of the same kind in open grounds, is ten times greater, than in such a one as is well enclosed: we have shewn its heat is greater, but that is not all; drouthy seasons are attended with burning winds: these parch up the plants which the heat only faded; and against these three causes of mischief no common plant can well stand. 1. The heat evaporates the juices. 2. There is no recruit from showers. And, 3dly, The dry winds follow, to shrivel up what the sun had faded. The leaves wither and droop, and they must fall off. We have shewn what are the uses of leaves on plants; and it is plain the loss of them must be destructive.

Exposure to drying winds compleats the destruction of plants; therefore the farmer is to guard against that. The elements will not obey his pleasure, but he may defend his crop from winds.



winds. The sun will dart its rays in spite of all his caution; and there is no art by which he can make the clouds drop their treasures of water: to these therefore he must submit; but the mischief of these is ineffectual without the winds that follow: and he can guard his crop against them. Let him thicken his hedges at the bottom, and plant trees in abundance, that will grow to a height, and almost meet by their branches all the way up. This will be a defence against the winds, and in some measure against the sun. The thickness at the lower part will break the force of the former, and the large shade spread over the field for a great part of the day, will defend the growth against the latter. The plants thus sheltered will enjoy a state of the air by many degrees cooler, than if the sun had its full effect: the trees will, by the great quantity of watery matter they perspire, render the air less scorching.

The profit of wood will recommend this method, for it is very considerable: on all accounts we advise the farmer to fall into the practice, but still within the guidance of moderation; though we advise him to thicken his hedges about those places, where from the situation drought is like to be most destructive; yet we mean this should be done in a prudent manner. The larger the field the loftier should be the trees. For small enclosures a well grown white thorn hedge, is a sufficient defence: in those of a larger extent the pollard hedge will be most proper; and for the largest, tall elms, which are to be indulged in spreading out their side branches, provided they do not over-hang the ground.

We advise the farmer to imitate the practice of the gardener in cutting of those trees, which he means should grow fan fashion. Let him cut off the boughs of elms that grow toward one or the other field, and encourage such as run parallel with the course of the hedge. The side boughs will thicken, and be a better shelter, and the growth will suffer nothing from their overshadowing or drippings. There must be always a leading shoot left for the top, to carry up each tree in height, while it is spreading breadthwise; and then with all the advantage there will be a great deal of beauty. This is not to be considered by the husbandman, at the expence of convenience, but when it falls in with that, 'tis worth regard.

### C H A P. III.

*Of the care of the fields in the management of shelter.*

**T**HE husbandman will see we have contrived for him an easy, and effectual remedy against the principal danger from drought; but he will observe, these hedges must be cut,  
and



and these trees lopp'd at times ; and it will be natural to ask, what is then to be the defence of the crop ? The improvements introduced of late years into husbandry, give a great advantage in the variety of crops ; and he will find that change in no respect more serviceable than the present.

Some plants will endure drought much better than others ; and these he must contrive to have upon his lands at the time when he is to cut his fences. This will not be difficult, because the cutting is in his own choice ; he may not only do it when he pleases, but he may know a year or two before hand, and provide accordingly. The deeper plants root the better they resist drought ; and the reason is obvious, because drought affects herbs only in proportion to their want of resources against it, and these resources are always greater the deeper they are sought.

Let the husbandman proportion the growth to the condition of the shelter. He will know at what time it will be bare, at what time it will have grown to a moderate defence, and when it will be in its full perfection : therefore let him, against such years as the shelter will be most perfect, sow those crops that root the most slightly, for they will least bear drought. The husbandman's discretion will carry him on to sow, for the time of middle growth of his fences and trees, such crops as require a moderate shelter, but will not very easily be parched up : but the great consideration is with respect to the years in which the fences will be bare.

Of all plants, faintfoin is the deepest rooter : therefore let the husbandman provide a crop of this against the cutting of his trees. Let him sow it early, and as it will enjoy the benefit of the thick shelter while young, it will thrive so well as to establish itself in the ground before the lopping. It may then be left to nature : it will stand the exposure ; and as it is a crop that lasts several years, it may conveniently be continued upon the ground while the fences are growing up, and the trees recovering their branches. When they are grown so as to afford a good shelter again, the faintfoin may be broke up, and the ground will be in excellent condition for another crop.

We have mentioned faintfoin, but the farmer is not tied down to this only plant, he may take his choice among all the deep rooters. Dry and barren lands suffer the most from drought : therefore this care should be most taken with respect to them : the fences should be planted thick, and the trees at small distances : we have before given the farmer his choice of several that very happily suit such soils. In many parts of the kingdom, since inclosures have become more general, lands  
that



that were worth little while open, are come to great value by this article. The crops on these lands are least able to bear parching winds, and therefore they most evidently of all shew the effect and benefit of shelter; but this effect on them is sufficient to recommend the practice universally.

## C H A P. IV.

*Of suiting the crop to the soil, to prevent the effects of drought.*

**T**H E R E are certain soils more subject to have the growth damaged by drought than others; and there are also certain species which shew the effect of those parching winds, that attend this accident more than the rest; and that are less able to bear it: these considerations may be of service to the husbandman, for providing against the effects of this temperature of the elements; and serve as a kind of general rule for his practice.

We suppose the farmer situated in some spot where there are the common accidents and common advantages attending his profession; but from thence we shall now carry his observation to those places where a great deal of the land lies low, and in the way of damp and of overflowing. The soil in these places is usually a rich deep mould; and where they have the advantage of any tolerable plantations about them, they are from their low situation well sheltered. In many places ditches are made to serve by way of fence. But this is an ill practice on such lands, for they are exposed to all the damage of parching winds. It is less than on dry barren soils; but still it is considerable. These lands therefore we exclude from the present observation: we speak of those which lie low, have a rich mould for their soil, and have tolerable shelter: of these there are abundance about the borders of the fens; and if these be examined in the years of drought, they will be found loaded with the largest and richest crops.

Hence a rule of practice is very easily to be deduced. If the farmer have such land divided by ditches, and it bears poorly, while he sees that of his neighbours produce well; let him plant the sides of his ditches with willows at moderate distances, and as they have naturally a naked trunk, let him set osiers between them. The method we have delivered before, and the effect will be very great. The tall heads of the willows will cast a proportioned shade, and the osiers, which are full of leaves down to the bottom, will keep off the winds. Only particular crops will thrive where the lands lie very low, which is usually the case where there are these ditch partitions; but



but all these will receive vast benefit in dry years from this fence.

We have advised the raising faintfoin on ground, that is to be left exposed by the cutting of the hedges, and lopping of the trees; and we shall add, that on this occasion it is the farmer's business to sow his crops removed from those higher and more exposed fields, upon the lowest grounds he has; and those which are best sheltered. The faintfoin on the exposed ground will so cover the surface with its branches, that if a hot and drougthy summer follow, it will be much less affected by it; and the herb receiving its nourishment from a great depth, will flourish, because the sun will not have power to affect it, when the superficial part is thus sheltered; while the high grounds thus stand out a year of drought in their most defenceless state, with a good crop upon them; the lower lands will, according to their nature, yield the best crops of all. On the contrary, if an unexpected wet season happen, the crop on the high grounds will be the stronger and finer for it; and those on the lower grounds must be assisted, as we shall shew when we come to that head.

#### C H A P. V.

*Of the effect of drought on trees, and the way to defend them from it.*

**T**REES are affected greatly by drought; but it is only while they are young: they are at that time destroyed by it more easily than plants of the herbaceous kind; but when they are established in the ground, they remain unhurt by its utmost violence. In this experience confirms the effect of drought, upon deep and shallow rooted products. The principal power of this accident is on the surface of the ground; and when the root of any thing pierces to a proper depth, the whole remains unhurt by all that happens above.

We have recommended planting of trees in waste grounds and in hedges, and we shall here obviate the great discouragement attending that practice, which is the frequent failing of the plantation from drought.

We have mention'd accidents of wind and the like, with the way of guarding against them: these destroy many trees, but drought more than all: and this especially where the plantation is made on an exposed barren piece of ground. These are places where trees would be most desirable, but from the frequent failure of them farmers have entertained a notion they will not grow there. That nature can raise and support them in such places is evident, because we see them wild and of fine stature, though  
 1 it



it is so difficult to make them thrive when a plantation is intended on such ground.

Let the husbandman imitate nature. Let him sow the trees, and not plant them. And as we have told him what is the great cause of their failing, let him guard properly against it. The practice of laying stones or rubbish about the roots of new planted trees, is very good, and may be also used for those raised from the fruit; but we have prescribed a method for the securing smaller crops from drought, which may be transferred to these with advantage. It is easy to sow something for shelter at the same time with the tree, and they will rise together.

Every shrub for shelter will not thrive upon barren grounds, but there are enough that will. A poor ground in an exposed field is the proper soil for furze. This will grow from seed in these places, and nothing can be more proper for the service. When the husbandman sets about a plantation on this kind of ground, let him, at a distance round every spot where he intends a tree shall stand, sow a good quantity of furze seed in a circular trench. This will defend the young shoot of the tree from winds, and also from cattle. By this contrivance the shoot will rise prosperously, and when it is out of danger the furze may be cut up for use. Thus will a fair plantation be raised; and it will succeed in the same way as those which are established in like places naturally. They have risen from scattered seeds or fruits, and have stood their chance, and throve even without those advantages.

If, after the furze is removed, the trees appear not to thrive well, from the heat and dryness of the season, and from the exposure, let the farmer order a bank of earth a foot and a half high, and a yard broad, to be raised round the bottom of every one of them, and they will immediately revive; this presses and strengthens the earth about their roots; and it gives them, in some degree, the advantage of deep rooting, which is the greatest of all defences against drought.

#### C H A P. VI.

*Of preserving water for cattle in seasons of drought.*

**W**HILE the crop suffers by the want of rain, the stock of the farmer will be endangered by the drying up of the reservoirs of water: the utmost care is to be taken to preserve what there naturally is; and to obtain more from other sources. The common watering places for cattle, where there is not the advantage of brooks and rivers, are pits, dug purposely, which receive the rain of the wet months, and preserve it during summer. Let him clean these at proper times, that there may always



ways be a due depth for receiving the water. The mud thrown out will pay the labour. Let him examine whether they be well situated, and of sufficient bigness. If they are not in the best places let him have others dug; and if they be too small, let them be enlarged. The observation of one dry season, will inform him.

When pits are well placed, and of a due size, let him observe how they hold water. If they become dry in the time when they are most wanted, let him grudge no price in fitting them for the purpose. There are two ways of a pond's losing its water, and they are equally mischievous, but equally within the reach of remedy. It may be lost through the bottom, or evaporated from the surface, or both may conspire to drain it.

Let the farmer provide against both, and examine whether one or the other, or whether both be in the cause; and apply his remedy accordingly. Let him observe how those ponds are conditioned that hold water best, and imitate by art what he sees in nature. When he casts his eyes about in a dry summer, he shall see many of the largest ponds dry; and many a small hole well supplied. Some old fallow, or other such tree, grows at the edge, and under this the water keeps quiet, and fresh in the greatest heats. Let him examine the bottom, and he will find it clay; or if otherwise a coat of stiff mud covers the proper soil, and answers the same purpose. A sound bottom and a covered surface are the two great articles for preserving water. Let him, in all new ponds, clay the bottom, unless they be dug in natural clay; and in old ones, repair their bottoms, or coat them altogether fresh. If a good clay be used, and careful people employed, the remedy is absolute, for a bottom of this kind will hold as well as one of lead.

When the bottom is taken care of, the next attention is on evaporation. The sun dries up ponds very much; and the winds more. In their pits in France, where they evaporate sea water for making bay salt, they find one day's sun, with a brisk wind, takes off more of the water, than three days of the same bright sun in a calm.

The same precaution that defends the water from one of these, preserves it from the other; this is the sheltering it at the edges. Let the farmer keep in mind the old fallow, which he sees over the pond that retains water, while others are dry. Let him plant all about his new made or new bottomed pond, except in one place, which is to be left free for the cattle; or if it be in common to two fields, which is a very good practice, let him make two such openings. Let all the rest be sheltered with any of the trees that will thrive in a wet soil;

none



none is better than the fallow, for it grows quick, and its leaves do not give an ill taste to the water. The boughs, as they grow, should be made to stretch and meet from the two sides, over the deepest part of the pond. The sun will thus be kept off, and the wind will have no power. The water will be kept in, and will be clearer than when it is disturbed by every blast.

If there be any where, in the adjoining ground, a spring, that should always be brought in, and a good conveyance made for the waste water; the consequence will be, that there will be a constancy of fresh water, and yet the ground will be kept dry. The frequent rains with us make people neglect the care of these reservoirs of water too much; but in other countries they are extremely nice about it, and if we took their example, many of the disagreeable consequences of drought would be prevented. When the farmer makes a new pond, or new clays the bottom of an old one, let him be careful to do the work well: for if there be the least defect, nothing will do but new working over the whole. For a new pond, one coat of clay, of eight inches well ram'd, and another of six inches, covered with rough stones, is the best method. For the new bottoming an old pond, a single coat of clay, and the covering of stones, will answer the purpose.

#### C H A P. VII.

*Of obtaining supplies of water when the common ponds are dry.*

**A**S common ponds will be exhausted in a season of drought; and the better will sometimes fail; it is needful to consider farther what may be done in such extremity; for a supply must be had somewhere, or all will be lost. Thirst to cattle is more terrible when in the extream, than hunger.

We have mentioned, the taking advantage of springs when they lie near the surface: they always may be had at greater depths; and this is the proper resource. Wells must be dug in fit places, when all other supplies of water fail. It is often a discouraging thought, to consider to what depths it may be needful to dig for water: but there is absolute necessity of the water, and a certainty of the supply: for water may be had any where, if the expence of digging be not spar'd. There every where run courses of wet at different depths, usually near the surface, wherever they lie they must be found on these occasions, or all will be lost.

When the well is deep, and the supply that is required from it is great, there must be proper contrivances for getting it up. Men may be employed to draw it from small depths, and in moderate quantity: but where more labour is required an ass



may be used, or where there is need, assistances may be employed from the principles of mechanicks. The wheel in which a beast walks to raise water from a deep well, is a very good contrivance: a double wheel, with coggs, is another method; it makes the draught easier than in the common way. The double wheel, with a long line to the hand, is also another improvement, because the weight rises easier.

Where there is a large stock to be watered, the common small buckets are not to be used; in proportion as larger are required, and the weight to be drawn up is encreased, the more needful it is to be careful of the force and assistances in drawing. A good way of drawing great quantities up with expedition, is to place a large wheel at the end of the windlas, four times the diameter of the windlas. A thick rope is to be fastened to the bucket; and a smaller of due length to be wound round this great wheel. The length is to be such, that when the bucket is in the water, the small rope is all wound upon the great wheel, and the bucket being filled, a servant is to take the end of this small rope and go forward, till, as that unwinds, the bucket is drawn to the top. A single man will thus be able to draw up a bucket of twenty or five and twenty gallons, with great expedition, and little labour.

These large buckets may be made so that they shall fill without turning sideways. A large hole is to be made for this purpose in the middle of the bottom of the pail, and a cover is to be fitted to it in the manner of the sucker of a pump. As soon as the bottom of the pail reaches the water, the hole will open and the bucket will presently fill; then, as soon as it is drawn out of the water, the cover stops the hole and it comes up securely. This prevents the sinking of the bucket, and a great deal of trouble. Any wheelwright will be able to make such a wheel, and it will be a good method to form it with teeth, and with a ledge of wood so falling upon it, that as the servant moves forward in the drawing, nothing stops the pail; but as soon as it is high enough, the ledge of wood bearing against the teeth, stops it. The structure of a common jack wheel will explain this easy piece of workmanship.

The way to be most expeditious in raising quantities by this method, is to have a receiver for a great deal of water placed ready near the well, and a trough long enough to reach from the ledge of the well to it. This trough is to be placed under the bucket, and it will be easy by fastening a cord to the cover of the hole within the bucket, to pull it up when the trough is set under; thus the bucket will both fill and empty without turning down. Where such contrivance is wanting, let the  
husbandman



husbandman see if there be no place in the higher ground where the water is detained. Ponds on the tops of hills are not uncommon, and where there is water above, it is easily brought down to be of service. His care should be to keep the pond at the top well sheltered and well bottomed, that all that comes to it may be preserved in it, and then pipes are to be laid from this to the place where water will be most needed. One should be always carried to the house, and another to a place where the cattle may be conveniently watered. Thus will a supply be often preserved, when all others, except deep springs, fail; and in this way there is nothing of the trouble of drawing up and emptying, as in the others.

It is frequent that springs rise on the tops of hills: these will fill such ponds, and afford a lasting resource: but without these the assistance of such a supply is very common. I shall refer the reader about London to one familiar instance. On the right hand side of the road to Harrow, about a mile from Paddington, is a very considerable farm occupied by Mr. Godfrey. It is near the top of the hill. After a few more paces you arrive at the top, which is a flat of no great extent: there is a little sinking in this ground toward the middle of the flat, and in that place is a large round and deep pit. This is always well supplied with water; and from this Mr. Godfrey has pipes laid, which go to his house, and afford a continual quantity for all needful uses. At first sight a person might imagine there was a spring in this place; but I have examin'd and found it otherwise. The soil is all a hard firm clay: by this means the pond is well fenced to keep water, and its depth to the surface shelters it very well from the wind. It receives the water no other way than from the rains that fall upon the flat, at the top of the hill: but the soil there being all the way clay, it takes almost all that falls on the surface. Very little is absorbed by the thin coat of mould which covers the clay, and the rest sinking toward the pond, is received into little covered drains, that discharge themselves into it.

Nature has, in many cases, given the same opportunities of supplying a farm; it were well if others had made the same advantage of them. It may often be necessary to bring water up from a lower place, when the cattle cannot of themselves get at it. In this case recourse is to be had again to mechanics. There are various ways of getting water from below, some suited to larger and others to smaller purposes, the most convenient will be the Persian wheel. This is constructed at a moderate expence, and will last a long time: and the quantity



it will raise is sufficient for all possible purposes in the service of the largest farm.

C H A P. VIII.

*Of the signs and notices of drought to be observed by the farmer.*

**A**S a continuance of dry weather is the source of this terrible calamity to the husbandman, it will be of use to him to make a rational guess, whether the dry weather that at any time alarms him is or is not likely to continue. We smile at the common prognosticks of weather; and acknowledge those which are better founded are uncertain: we could therefore have gladly dropped the entering upon the subject, but that we think it may be of real service to our readers; therefore we shall lay down such observations, as are most likely to inform the husbandman what he is to expect; cautioning him never to have recourse to them but in continued dry seasons, and then to judge of them as we deliver them, not as certain, but in some degree probable; accepting them as the best guides he can obtain, and therefore consulting them for want of such as would be less dubious.

Birds, beasts and fishes are warned of changes in the air, by notices that either do not reach us, or what we do not regard. We see in the weather glasses also the great effect of changes in the air; and we perceive it in many other natural instances. These shew that changes of this kind affect both solid and fluid substances; and therefore that we may seek for them, and observe the marks of them, as notices of succeeding changes or continuance of weather in almost every object that is before us. In things inanimate we can only perceive them by examination. A board will swell against rain; but if we do not observe and examine it we shall not see it: in living creatures their actions shew what they feel; their bodies are affected by the changes of the air, and they are guided by instinct, more certain than reason: therefore we may observe their actions as prognosticks of what will happen.

These creatures are the most sensible of changes in the air, because they live exposed to it, and can feel no changes but what are natural: mankind who live in houses alter the temperature of the air by fires, and are by that means made incapable to judge of its real variations. The change from the air of a room with a fire, to that of a field or garden, is so great, that it quite drowns the small variations which may have happened in that free element. For these reasons other creatures are more sensible of these changes than we; and as they have  
motion



motion and voice, we are to watch both for the finding out their nicer feelings.

In danger of drought, if there be herons in the neighbourhood let him observe their course. This bird delights in a lofty flight, and will indulge itself in it, when opportunities of satisfying its ravenous appetite do not call it lower. When the heron flies high in the middle of the day, it is a sign the dry weather will continue. The food of this rapacious bird is principally small animals that haunt about the waters. Fish are its delight when it can catch them; but they are too swift in their motions for its general supply: frogs, black snails, and other such creatures, are its common prey. The dews of the night call out these early in the morning, and this is the heron's time of preying. When the earth grows dry, and the sun hot, they retire into their hiding places, and the bird indulges himself in his airy flights. This is his custom in dry weather: but if there be a change for rain, these insects feel it, and they crawl out of their holes by day. The heron feels it also, and instinct guiding him, he descends in search of them: his flights are low, and he is frequently stooping. Upon this principle depends the sign of drought from the heron's flying high; and it is one of the most certain that are to be gathered from the bird kind: but it is not on any one of these the farmer is to build his opinion: things doubtful are no way so well confirmed, as by being supported one from another.

All beasts are rendered faint and languid by a continuance of hot dry weather; and while they continue so, 'tis a sign the cause will continue. The farmer should watch the actions of his stock, while they seem inactive and dull; while they rise late to their food, and eat it carelessly, it is a sign the drought will continue. They feel the first approaches of rain; and the farmer may know it will happen by their conduct. After a long series of dry weather, sheep will rise an hour before their time to feed: when rain is coming they and all the other cattle will feed heartily: their motions will be brisk, and the cows and the oxen will toss up their heads and snuff the air with pleasure.

When the farmer has these notices of rain from the bird and beast kind, he may give up his fear of drought. Many more might be named, but these after a long drought are certain. To these signs from the birds and beasts we may add some from fish and insects: they are not of equal certainty; but they will serve as a confirmation of the others.

If the farmer has a pond with fish, let him look into it carefully. If his fish keep out of sight the drought is likely to con-



tinue: if they come up to the surface after disappearing many days, he may imagine there will be rain. Fish love air, but it must be a moist air; and they feel it under water.

This is another though a less reason of the heron's leaving his high flight when rain is coming. He has no chance for fish while they keep in the deep water; but when they rise in the shallows he may surprise them. Eels keep all day under the mud in dry weather; but they will put up their heads on the approach of wet, and sometimes crawl on the surface. Added to instinct here may be the assistance of eyesight. The sportsmen know from what a height hawks will see: the heron has eyes of the same piercing kind; and the sight of fish rising to the surface, and frogs crawling out of their holes, may bring this bird down, as well as the guidance of instinct upon his feelings. In long droughts worms penetrate deeper into the ground, for they must have moisture: their skins dry up when exposed to a parching air. In these continuances of dry weather they rarely come abroad: and while the farmer sees nothing of them or their casts upon the earth, he has reason to fear it will continue.

There yet remain observations on things inanimate on earth, and in the skies. When the wood-work about his house and yard moves loose and easy, and the more coarse works rattle in the joints, it is a sign dry weather will continue; and when the surface of marble or smooth stone in chimney pieces and floors is perfectly dry, it is also of the same purport. We speak of rooms in which there are no fires. Let the farmer observe the sun at rising: if he rises small and blue, too bright to be looked upon, and in a clear sky, there is the appearance of a continued dry time. When there are rainy vapours in the air, they enlarge his apparent bigness, and shew him of a fiery colour. At night let him watch the moon and stars: if they are bright and clear, there is reason to believe the dry weather will continue. If the horns of the new moon look particularly sharp, that also is a sign of its lasting. The clouds may give some signs of drought also; though from their fleeting and inconstant nature, less dependance is to be placed on them than on the other tokens. If the sun set red, that is, if there be a light red sky in the west at evening, it is a strong sign of the continuance of dry weather; especially if the east be free from clouds at the same time. When only a few light loose clouds are seen in the west at sun-rise, and they soon disperse, it is a token of the continuance of the dry time.

The last thing to observe is the wind: the north and the east are the fair weather winds in England; the south and the west  
those



those which bring rain. When the wind seems settled in one of the dry quarters, or in changing goes only toward the other, there is the probability that he is to expect a season of drought.

There are lesser observations to be made for the foreseeing sudden showers and days of clear weather in the common changeable course of things: these we shall treat of under the article of rain; but in this place we are considering a thing of much more importance than those sudden variations.

## C H A P. IX.

*Of rains.*

**W**E are talking of the extreams of those things, which are in themselves, when moderate, of the utmost advantage: heat was the last named, and moisture is to be treated of in this place. Both are needful to the growth of plants; they are indeed the two great requisites to that purpose: but both may be destructive to the crop and stock of the farmer. The best things when improperly conducted may be the worst; and it is in nothing so evident as in these articles. All lands receive damage by excessive rains; but those most which lie lowest. From these it is necessary to remove them, or they become ponds or bogs.

Every piece of ground has some descent: the farmer's business is to find that; to cut channels for the reception of the abundant water, and to lead them according to that descent to discharge themselves at the lowest place. Beside the damage that may arise by heavy and continued rains of winter, there are seasons at which every shower may reasonably alarm him. These are particularly the times of hay making and harvest. For the success of these operations he is to seize upon every good hour that comes; and it will be of importance to form some conjecture what weather is likely to follow. It is a matter of indifference whether he bring the scythe into his meadow, or the sickle into his field, one day or another. There is a time at which the grass has most substance, and when the grain is richest in the ear; but this is not limited to a day.

The farmer may be tempted by fine weather to begin both somewhat sooner than he intended; and he may, on the threatening presages of rain, defer them some days. As it may with some tolerable degree of certainty be foreseen, we shall give all that have reason for their foundation. We shall select those signs for which there is foundation in the laws of nature, and which we have experience to confirm; passing lightly over the others, and utterly rejecting the fancies of weak and



credulous people, which have too long imposed upon the injudicious.

### C H A P. X.

*Of the signs and notices of rain to be observed by the farmer.*

**T**H E opposites to all those things we have nam'd as signs of drought are notices of rain : when the heron flies low ; when the cattle rise early to their eating ; when fish swim on the surface of the water, and worms crawl frequently out of the ground ; when wood swells, and marble is wet ; when the sun looks big at rising, and the moon and the stars appear dull ; when loose clouds fleet about the west in a morning, and do not disperse as the sun advances against them ; and when the wind is south or west, and changes only from one to the other of those quarters, rain is to be expected.

Birds feel the approach of rain with pleasure : a moist air seems best suited to their nature, and particularly to the water-fowl. It also brings out of their lurking-holes the myriads of insects which are their food. If geese and ducks prune themselves, seem more than ordinary chearful and lively ; and the crows in their hoarse voice caw from the tops of the trees, he is to understand it as their rejoicing at a damp air, and the approach of rains : these last are extremely sagacious. When they fly about tossing up their beaks, and are very noisy, the rain is coming : and when they stalk by the sides of brooks and ditches, it is near at hand.

When swallows fly low it is a well known signal of rain, and is founded on the plainest reason. The food of these birds is little flying insects, and all these unable to bear up against the weight of the air when loaded with damp, fly low. The crying of peacocks is another known sign of rain : it is that bird's note of joy. His voice is hoarser than the crow's ; but it is a sign of his satisfaction.

Sheep shew the first signs of the approach of rain ; it makes them sprightly : they leap about and play with one another. The ass foretels it by his braying, which is also his note of satisfaction ; and the cows and oxen by tossing up their heads and licking their snouts.

These are the signs of rain gathering in the air ; but when it is just at hand cattle give other kinds of notice. They flock to the hedges, and seek shelter under trees.

Insects may be of use this way to the farmer ; their tender bodies give them notice of the changes in the air long before men perceive it. The bees keep within their hives, and the ants leave their busy motions, and retire deeper into the ground. They



They carry with them those cases in which the winged sex are lying for their change. These common people call their eggs; but that is an error.

From the animal kind we shall lead our farmer for pre-fages of wet to the wild weeds of the field, and to the common products of his garden. The poet speaks of the closing of the flowers of common marygold at evening: he calls it

*The marygold that goes to bed with the sun,*

and this, and all the other flowers which have that quality, shut up in the same manner more or less when rain is coming. The flowers most newly opened, have this quality most sensibly. Dry weather opens them fully; and as wet is nearer or farther off, they draw together their leaves in a more close or loose manner.

In the corn fields the farmer will meet with a little plant famous for many virtues, its name is pimpernell, he will know it by its small bright red flowers: these open in dry weather, and shut up against rain. Wet may be foreknown a whole day before it falls by this flower. The heads of dandelion gone to seed are so many globes of down in fair weather; but against rain they contract.

Let the farmer look into his clover field, and he will find another mark of rain which has been observed these two thousand years: clover, when rain is coming, stands more upright and firm than at other times; the stalk is swelled and stiffer. This is true in the same manner with many other plants, but in none so distinctly. Wood swells with the wet, and the softer kinds most. Doors will not shut; for both the posts and the boards swell: window-shutters stick, and boxes are hard to shut or open: drawers stick in their cases.

From these things let him turn his eyes up to the heavens. The sun's looking red and large is a sign of wet; and let him mind the clouds that accompany this appearance, for they will not only confirm that rain is falling, but in some measure shew the time when it will come. If clouds presently after such a rising of the sun gather in the sky, and the air appears thick and watery, it will presently rain; and the hotter the weather, the sooner the rain is to be expected. When at sun-rise, or soon after, there is a circle or part of a circle of a blueish or whitish colour about the sun, there may be expected rain some time within the day. A red sun at rising is a sign of rain; and the same is to be added concerning its looking dull and white. The natural colour of the rising sun in a clear air is the same that it has at noon day, a deep fiery blue, which the eye cannot look upon a moment. When he is dim and faint, and  
looks



looks white, it is owing to watery vapours, and wet is near.

If the moon have a large circle of a whitish colour round her at a distance, it is another sign of rain : and when the stars look larger than usual, and fainter, and twinkle less, it also presages wet the next day : this is confined to the fixed stars ; for the planets, though larger, never twinkle at all.

The clouds give many prognostications of wet. When there are small ones scattered about the west in an evening, rain is to be expected the following day.

The rainbow is not sufficiently understood. It bespeaks a change : if it appear after dry weather, it foretels a great deal of rain ; but when we see one after a great deal of wet, we may expect fair weather. A bright rainbow in the east is usually followed by a great deal of rain.

Mists from waters afford a regular and certain prognostick of the succeeding season. When they are thick in the morning, and presently after disperse, they are tokens of fair weather : but when they rise to the neighbouring hills, and hang in the air, they usually presage rain, at a day or two distance.

#### C H A P. XI.

##### *Of the several signs of fair weather.*

**T**H E signs of fair weather approaching are these. A clear sky in a morning, and a bright sun-rising in it, are the natural tokens of a good day ; and when at evening he sets in a light and bright red sky, and without heavy clouds, there is reason to entertain good hope of the next. When the moon looks bright and clear, and has no foggy circles round her it is well ; but the greatest promise is from her appearance a few days old. Let the farmer, whose harvest approaches, watch the new moon. If he see her horns sharp, clear, and fine, he may reasonably expect fair weather till her full. The stars give the same tokens in the same manner. When they look sharp and bright, and twinkle strongly, there is a clear air, and it is like to continue.

White, small, and scattered clouds at the north east, are a token of several days fair weather. Look to the hills, and if their tops be clear, expect bright and serene days : even the stone and brickwork of buildings, in some degree, gives the same notice. These are seen more clear and distinct in the pure air, that brings in fair weather, than in such as is full of watery vapours, and precedes rain.

Light mists, gathering early in the morning over waters, and soon dispersing, are signs of fair days. If a shower happen, and there be a rainbow, let the farmer watch it carefully ;



if the blue be a strong colour, and the yellow bright, it is a sign of clear weather quickly following.

When gnats swarm in an evening, and the glow-worm crawls abroad at night, good weather generally follows. These tender insects dread the rain, and hide themselves when instinct gives notice of its coming.

The bee is a sure director. Her little organs feel the approach of wet; and keep her prisoner in the hive, or limit her to short excursions when it is near: therefore when she flies far, and returns late, good days are coming. When the kite and the swallow fly high good weather is coming. They can see their prey to a greater distance in that clear air; and they love lofty flights. When the sea birds leave the shore; and when the owl hoots softly, gently, and composedly, fine days may be expected.

When roach and dace leap up out of the water, and when the spider hangs its light webs in the air, fair weather is coming: experience, more than any certain reason, establishes this token from the fish. As to the insect, it is plainly the direction of instinct. Its tender and exposed body feels the change of air for dry weather; and instinct directs it on that notice, to venture out its threads, because there will be nothing to hurt them.

Lastly, we shall give the husbandman a notice which he is to regard more than any of the preceding, because it answers doubly, as a promise of fair weather for the present, and a denunciation of rain soon after. This is that thick dark sky we sometimes see for a continuance of time, without either sunshine or rain. This is a thing that frequently happens in England about the harvest: and the greatest regard should be had to it: it is an unerring rule, that such a sky is followed by some fair weather, and rains come soon after. The farmer needs not be afraid of sudden rain, when there is such a sky. There will be an interval of fair between, which will serve to finish his work.

## C H A P. XII.

### *Of hail.*

**H**A I L is more dangerous to the gardener than the husbandman, whose products being at all times exposed to the weather, are more hardened: when it is very violent, and the stones large, it will do him some damage; but it is less to be foreseen, than any of the other accidents. In the warmer parts of Europe it is terrible to the husbandman, because the heat brings his crops early, but neither there can he foresee or guard against



against it. These storms in those countries are less frequent than in ours, but sharper.

The husbandman in these storms of hail is to watch whether they seem common; for in these there is little harm to him; or whether they threaten to be very terrible: in the latter he should be quick in driving under shelter, all such parts of his stock as could be hurt; his lambs and other young creatures. His crop must take its chance.

As we have endeavoured to make the farmer acquainted, in some degree, with those things wherewith he has any concern, we shall add here a succinct account of hail.

Rain is water raised in vapour by the sun, and falling again in drops. These drops often pass through a considerable depth of air, before they reach the ground; and it sometimes happens that they are frozen by the way. A frozen drop of water can be no other than a small roundish piece of ice; and hailstones are such. In particular cases, hailstones have been of odd shapes, as long, or flat and thin, and starlike, but these are uncommon. The long and flat seem only the effect of various degrees of freezing; but the starlike hail, is of another origin. That shape is the natural form of snow. Therefore, as the common hail consists of drops of rain frozen in their passage through the air; this is composed of flakes of snow, frozen to the hardness of ice, in the same manner. Though these fall with less weight than the others, they are attended with more damage, especially to the gardener; for when they are driven before a violent wind, their sharp edges cut off the blossoms of fruit trees like so many knives.

A good practice in gardens is, to stick pieces of furze bush among the branches of the fruit trees: we name this because it may be transferred, if there be occasion, to the field, if the farmer have any young crop for which he is in fear from hail storms; he may with little expence stick up large furze bushes among it at certain distances, which rising above the proper growth will, by their bushy heads, defend it from the fury of these storms. This is never needful, but upon particular occasions, and they are not to be foreseen. The driving in of cattle and poultry is the principal care; and 'tis better this should be done when there was no real necessity twenty times, than once omitted when there is.

Mischievous storms of hail generally are of small extent, and may be foreseen a little before their coming, by a thick black heavy cloud, with chillness in the air and wind. Toward the end of April, in 1697. there was one of these in Cheshire. A black cloud foretold its coming about a quarter  
of



of an hour. This was time enough to have got in the tender cattle, but the farmers were not aware of the danger. The breadth of this heavy cloud was about two miles, and the course it took before it dissipated was sixty miles; along all this tract there was made the most terrible havock, but not the least beyond or beside it. The hail stones were as big as eggs, and some of the full bigness of a man's fist. They were pieces of clear, transparent, and very hard ice, with a white kernel in the middle, which seemed a little lump of snow. Some of these vast hail stones were smooth, others rough and sharp on the surface. They fell with a prodigious force, and killed fowls, lambs, and calves: beat down the young crops of every kind; and in some places, where the wind drove them slanting, plowed up the surface of the ground, and buried themselves an inch or two in depth; trees were broke and shatter'd to pieces in many places; houses damaged, and many people that were abroad much hurt.

This, and other instances, are not recited here for curiosity or an idle amusement: they are so many lessons to the farmer: examples of the losses others have sustained by neglect of driving in their young cattle; and cautions to himself for a wiser conduct.

There is recorded another hail storm the same year much more terrible. It happened in Herefordshire, in the beginning of May. Thunder and lightening preceded it, and for some time continued with it, as also a violent tempest of wind, that blew both the lightening and hail upon several houses, to their destruction. Nothing could exceed this but the hail sent by the Almighty upon the Ægyptians; nor can any words so strongly or so truly describe its terror, as those used on the occasion in scripture, "Fire mingled with the hail ran along upon the ground." In this terrible storm not only fowls and young animals of all kinds were killed, but some of larger growth; and some labouring persons in the fields, who could not reach shelter, suffered the same fate; their bodies being black and blue, as if beat to death with clubs. Oaks were split: the branches of many other trees torn down; and fields of rye were, in some places, cut down as if mowed off with a scythe. The hail stones in this terrible storm were of no regular figure: many of them measured fourteen inches round\*, and they seemed fragments of thick ice.

To these accounts of hail storms in our own country, we shall add two extreamly singular in their kind, vouched upon the most warrantable authorities: the one of these was in Flan-

\* Philos. Transact. N. 229.



ders, about Lisle, in the year 1686. and the other in France, in 1510.

In all observations of hail storms with us, they have been no other than pieces of ice, with a little lump of snow; but these had sulphureous matter either in their center, or in their whole substance. That at Lisle is recorded in the philosophical transactions \*, the stones were not only vastly large, but appeared dusky in the center; and such of them as came down chimneys into fires, when the icy part was melted, and this brown substance was exposed to the fire, burst with a loud report. Mezeray, in his history of France, mentions the other with all its particulars. A black cloud came over the face of the heavens, and darkened the air like night: in the midst of people's terror and astonishment, the most violent lightnings and thunder burst from it, and hail began to fall. This encreas'd in a most dreadful manner, and with a strong and suffocating smell, like burning brimstone. The hail stones this creditable author attests, were more like pebbles: their colour blueish, and their hardness like flint, till they softened in the wet. He gives an account of their size, which exceeds all others, and which, if less authenticated, could not be believed: he says some of them weighed a hundred pounds. We are not to wonder at the damage done by such a storm. It killed almost all the cattle, fowls and fish in the county; and vast numbers of the people †.

In calamities like these there can be no remedy, and there is no course to follow but religious submission.

We have shewn the husbandman what is in his power to do against others; and in general, where he has a tender crop, that stands much exposed, we shall advise him to use the easy method of sticking up a few furze bushes. This will not only be a defence against hail, but it will break the force of winds, and keep off those cold rains, they often carry before them. It is a practice so cheap, so easy, and so certain of doing some good, that we greatly recommend it.

### C H A P. XIII.

#### *Of snow.*

**S** N O W often is of great advantage to the farmer. A deep snow keeps all sheltered underneath it; and frequently defends a tender crop from those succeeding frosts which otherwise would have destroyed them. We have recommended to the farmer, on some occasions, the covering his tender growths in winter by the dry stalks of pease, or the like: snow often falls

\* Numb. 203.

† Mezeray's Hist. de France, vol. II. p. 339.



so favourably as to perform this service better for him than he could have done it for himself; more generally and more universally. It lies thick upon the young plants, covering them perfectly, and defending them from the nipping and destructive winds: it all that time mellows the soil; and when warmer weather comes to melt it in, nothing sinks down so gently or so gradually.

Snow is like ice, a watery substance congealed by freezing. When the air is warmer, it melts and falls in small rain. The most perfect appearance of snow is in form of a star of six rays, and its substance clear transparent ice: but this is not its constant or certain figure, the flakes are frequently imperfect.

There is an account of a red or bloody snow by an Italian, signior Saratti, preserved in authentick writings: it is said to have fallen near Genoa: but this is very difficult to be reconciled to what we know of the course of nature. Snow is no other than water frozen; and this water is raised in vapour by the sun. We are sensible that vapours do not rise coloured. The strongest tincture of cochineal will yield a colourless water, if distilled; and red port wine affords a colourless spirit. From these, and many other considerations, there is reason to imagine there has been some mistake in what is written on these subjects.

The snow is often advantageous, preserving a crop; yet like all other good gifts of nature, it may be hurtful in the extremes. Snow, which shelters his crop may, in a great fall, smother his cattle. He must watch it as it comes, and observe whether it will be in the common course, or excessive and violent. When he sees a vast quantity on the ground, and more in the air, let him drive in his cattle, and preserve them from the danger of being overwhelmed and buried in it, as they sometimes are in those hollows to which they fly for shelter.

#### C H A P. XIV.

##### *Of winds.*

**W**INDS are too frequently hurtful. Their great purpose is to thin and purify the air; and they will often be dangerous to the husbandman's crops, and even to his buildings; he must timely guard against them.

The sea would putrify notwithstanding all its salt, if winds did not stir and move it about: fresh waters, when large, would sooner suffer the same fate, and men would be carried off by pestilences raised from the vapours of such corrupted masses; all this is prevented by the timely ministry of the winds; and  
all



all their force may be broken with respect to the farmer, by a proper plantation of trees. We know from what quarters the most furious winds blow, and the defence is to be prepared thickest there.

There may be also particular cautions used, to prevent damage on extraordinary occasions; and as storms may generally be foreseen, these should be prepared according to the necessity. Wind is no other than air in motion. We are sensible there is such a thing as air, by the changes we perceive in it, but as it is too fine a substance to be the object of our sight; we only perceive it in the winds, feeling it by its motion; when still it is not perceptible to any of our senses, though manifest to our reason.

We in this island are subject to great variations and changes of wind, but this is not the case throughout the whole world. Between the tropicks there is a constant and unchangeable wind, that all the year blows from east to west. About the coasts of the ocean there are constant and regular winds also, at certain times of the day called sea breezes. They blow every evening from the sea to the land; and every morning from land to sea. In many parts of the world there are regular periodical winds. These blow one half of the year one way, and the other half the other. In our island the winds play about with great uncertainty; but in general north winds are most frequent in a morning, west at noon, and south at night. Winds blowing from off the sea are naturally moist: these, when they are gentle, bring only a pure watery vapour; but when the surface of the ocean is ruffled by them in storms, they carry off a part of the absolute salt water; this is called the spray of the sea.

This is mentioned as a practical caution for the farmer. Many of his crops will be injured: it is his business to keep a good hedge every way to the seaward. North winds in England are cold, and the southerly winds warm. A fall of snow will change the course of our winds. A warm southerly wind shall often be changed into a cold northerly one by this or by a shower of hail.

The strongest and coldest winds coming from the north and north east quarters, it is against these the greatest caution is to be had in planting. The sycamore has been happily experienced in the neighbourhood of the sea, where it thrives very well; and on the most exposed situations the yew is excellent. It will bear the exposure, and delights in the hard dry soil usually found in those places. After the yew we may name the elm, it roots firm, and is full of branches. Its growth is not slow, and there are few soils on which it will not thrive.



In trees planted for shelter to a house, there should be a particular method of cutting. The elm will grow to any form, and so will most other kinds. When the building is much exposed to winds, so must the trees be that are set to shelter it: therefore let them be so cut as to be least liable to danger. The head is the part over which the wind has most power, and it is of least service in sheltering the dwelling: therefore in these cases let the head be small, and the tree encouraged to shoot out into branches. The thicker they stand the more is the shelter, and the less they are in danger of being torn down.

## C H A P. XV.

*Of the signs by which winds may be foreknown.*

**T**H E R E are fewer notices of wind, than of rain or drought: but the husbandman should be the more careful in looking after them.

If there be a red dusky sky in the morning, and the sun rises white and deadish, he may expect violent gusts of wind; and generally some rain. When the sun is pale at setting, and goes down behind a thick dead-looking cloud, there commonly follows rain that night; and usually a strong and disorderly wind the next day. If the moon look dim and misty, and have a large hazy circle about her, the next day will be generally ruffled by winds. When the moon looks particularly bright, but has about her two or three broken circles, it is a sign of a storm. When the stars appear more numerous than usual, and have a lively lustre, it foretells a storm. When there are a number of small black clouds scattered in the heavens, and they move to and fro in a disorderly manner, strong and unsettled gusts of wind may be expected: these are the winds that do most harm to the products of husbandry, therefore the greatest regard should be had to this signal.

When a rainbow is thicker than ordinary, it is a sign of gusts and blasts. When there is a great deal of red, and that is fiery, it betokens storms. The rainbow is sometimes interrupted in its course, and as it were separated into many parts: this is always a signal of winds.

About the sea coasts a great deal may be gathered by birds. The more serene the air, the farther they keep out at sea. When they suddenly make to the shore, there is a hasty storm approaching: and when they keep about the shore, and will not venture into open sea, there will be strong winds that day.

There is in some places a small bird, which they call the *storm bird*: this has such knowledge, and such dread of a storm, that it makes immediately to the shore when it is near, on the



approach of danger; but at open sea it follows ships, giving token to the sailors.

### CHAP. XVI.

*Of the damages done by winds to husbandmen in their crops.*

**P**LANTS receive injury from winds at different periods of their growth: while young, the blast will often chill or shrivel them up: when more advanced, they are open to its force by their larger bulk: at this time they require to be very well fastened in the earth by their roots; and the most natural effect from the wind is the rocking them about, and loosening of them. This is little regarded by husbandmen, tho' very much by gardeners. In new planted trees the custom is to tie them up to stakes: and the stalks of flowering plants that rise to any considerable height, are in the same manner fastened to sticks. This is of the greatest service: preserving the roots quiet and steady in the earth.

The farmer's care in most respects, must be employed in getting strong and thick fences: and in particular crops there must be particular cautions, which we shall name. Of all his products, there is none which so often receives damage by wind as hops. The blasts of the spring nip their buds, and the storms of summer shake them at the root.

With respect to the nipping winds of spring, as the plants are not much advanced, they are easily sheltered by a high pale, or close hedge. With regard to rocking them at the root, the first defence is to chuse a sheltered place for the ground; or plant tall trees that may shelter it: and for all succeeding time the grand security is the fixing the poles deeply and firmly in the ground.

Corn is exposed to winds, not only when in the ear by lodging, which happens from winds and rain together, but while in the first shoot; sharp winds sometimes destroy the produce at this period. It is in open fields the crop is most liable to this mischief; and the same remedy will preserve it in both states: this is a good enclosure. Different soils require different shrubs for hedges; and we have given the farmer his choice of a vast variety of kinds for this purpose.

When a plantation of one kind does not succeed, he should try another; and when he is doubtful of the kind that may be best, it will be right to plant two. Most hedge shrubs will grow as well two together as singly. When there is danger, from the dryness and barrenness of the ground, it is a good caution to sow furze on the side of the bank. If the hedge succeed well, this may be pulled up; but it rarely does so well

but



but that a bottom of this bushy plant may be an advantage. The winds that nip winter corn in the blade, get in more at the hedge bottoms than elsewhere; and nothing is a better fence against them.

CHAP. XVII.

*Of the nature of blights.*

**W**E speak of the blight familiarly, because it is common: but among many things conjectured as to its origin, very little said has any foundation in fact.

The blight is a disorder that affects trees and plants. It appears in various forms according to the degree, affecting sometimes entire plants, and sometimes only parts of them. It is the same disorder which the vulgar call a blast. When it strikes a tender plant, it often perishes; and in some cases, the whole product of a field is lost at once. At other times it strikes only a part. The leaves often fall off, while the rest is unhurt. Sometimes all the leaves are attacked, and sometimes only a part of them. The leaves that are tainted, shrivel up and appear scorched; and the part of the tree which is thus struck is covered with little insects.

This disorder is common to all parts of the world: we read of blights wherever we read of husbandry; and for more than two thousand years men of ingenuity have been guessing variously at the cause. The Greeks looked on it as a stroke from heaven; utterly incurable and incapable of prevention. The Romans called it Robigo; and as they deify'd plagues and fevers, worshipping every thing they feared, their fanciful imaginations form'd a deity upon this occasion; they called the new-made god Robigus; and Varro solemnly invokes his blessing, that blights be kept from trees and corn.

In general it was attributed to the east winds; but Virgil, with more reason, lays the cause of it to want of care; and, instead of praying to an imaginary god, advises the farmer to betake himself to labour.

The early notion of attributing blights to east winds, has been continued to this time; and the curious seeing insects in abundance on the leaves and branches, suppose these east winds brought their eggs, and that they are the cause of the distemper.

Others attribute the cause to drizzling showers freezing upon the tender buds: in both conjectures there is some foundation; but they err contemptibly who attribute this disaster to the aspect of the planets. The accounts from those who maintain the other opinions are of little consequence, for they agree with



only one part of the subject. They attempt to explain only the blights of the spring. But there are blights at other seasons of the year. Corn is often blighted in its full growth, in a wet summer. This accident may happen without frosts, or without those sharp and cold winds, which though they frequently attend it, they are not the occasion of the accident. Those blights which are called fire blasts, in a hop ground, happen in July oftener than at any other time.

## C H A P. XVIII.

*Of the antient and modern observations of blights.*

**T**HE cause is not what these persons have thought; the farmer must seek farther for a remedy. The same accident that happens in our hop plantations, us'd to damage the vineyards of old Italy. The authors on country affairs, distinguish it by the name of Carbunculus; this we find was the same with the Robigo or blight. The time of this damage appears to have been the same with that in our hop grounds, and the circumstances also the same. Ours happens at the end of July, and theirs come on toward the ripening of the grapes. That it generally followed violent and short showers, which happened about noon, and were followed by clear sunshine. It was sometimes partial, sometimes universal: when it was partial, 'twas the middle of the vineyards that suffered, and when it extended through the whole ground, it was plainly perceived to have begun in the inner parts, and there to have been most severe.

If we compare with this the exact observations of Dr Hales, upon our summer blights in hop grounds, we shall see the antient \* and the modern † very happily explain and illustrate one another: and the farmer will thus, better than any other way, be led toward the discovery of the real cause of the disaster.

No plantation can so much resemble the antient vineyard, as our Kentish hop grounds: the season for their carbunculus is the same with that of our fire blasts, and the circumstances attending both correspond. The observations of our English philosopher are, that when there has been rain, and a hot gleam of sunshine immediately followed it, the fire blast has happened: that it has attack'd the plants in the middle of the hop ground particularly, scorching them all up in a manner from one end to the other.

The damage in a particular instance happened a little before noon; and the blight or fire blast ran in a line at right angles with the sun beams at that time of the day. There was little

\* Columella de Re Rust.

† Hales's vegetable Staticks.



wind ; and that was in the course of the blights. Those who would enquire into the nature of these disorders in plants, are extreamly obliged to the author of these punctual observations : for comparing them with what we find in the antients, we see that the nature of blights is a fixed and certain thing ; that they appear in the same manner, and observe the same course, and that they plainly arise from the same cause in the most remote parts of the world. This shews their origin to be always from the same principle : it is not impossible upon so much observation, to make a probable conjecture what it is, and thence to attempt a regular method of preventing its damage, or defending plants and trees from it.

## C H A P. XIX.

*Of the real cause and origin of blights.*

**A** Blight, properly so called, is a damage suddenly happening to trees and plants, which appears in the manner of burning, scorching, or shrivelling up the leaves, and often withering the young branches. This happens sometimes in spring, sometimes in summer ; and is what is properly called by the present name : if any say a growth of whatever kind is blighted, because it is starved, or distinguish by that name the damage done by frosts upon early blossoms, they are to be told these disorders of plants and trees come under the heads of accidents from frost, and accidents from want of nourishment, and will be treated of distinctly as such. What is here mentioned under the article blight is a distinct thing, and it is of its cause alone we treat in this chapter.

This blight sometimes affects a whole plantation, or at least the whole internal part of it, and sometimes only here and there a plant. In the first case, it depends in some measure on the nature of the plantation, and therefore may be prevented ; in the other it arises from causes quite out of our power. But it is of the less importance, because it affects but a small part of the crop.

The blight affecting the inner parts of hop plantations, and which the antients mention as destroying their vines, will also destroy whole crops of various kinds in the field : we shall see the cause of this, and therefore may reasonably propose a remedy. As it affects the inner parts of plantations first and most, and as it follows rain, there is reason to believe it is the effect of a vapour raised in those places, and stagnating there ; on which the sunshine operates to the destruction of the plants. If this shall appear to be the true cause of blights, the remedy will follow plainly. It consists in keeping the plantations



clearer : setting the several plants at greater distances, and giving the air free way between them.

If the outsides of the hop plantation escape, while the inner parts are destroyed, what is the cause, but that the free air coming to the outsides dispels and scatters that vapour, which stagnates in the close parts of the ground, till the sun, by its means destroys the plants. This plainly is the cause, and there is no other, nor can reason propose, or will experience vouch for any other course. Therefore the remedy will be to make the plantations more open and free to the purifying air. Hop grounds must be sheltered from high winds, or all will be destroyed ; but they may be left open on the milder quarters ; though they are to be defended, they are not to be smothered up. This is the effect of over caution in weak minds, but nothing is more dangerous.

When the ground is so disposed that the air can have free ingress to all parts of it, there will be nothing to fear from fire blasts. What is observed of the hop ground, holds good of all other plantations : I only name that because this is the most particular, and that in which it is most plainly shewn. The way to give the air this free passage, is to place the hills at greater distances than usual. We have laid down the best distance in general ; but where the whole ground is more enclosed, the passages within must be opener.

Too close planting is destructive to hops, by bringing in these blights, and fire blasts, because the hop is so tall and large a plant : in all others it more or less affects them, according to their height and manner of growth, and according to the exposure of their situation. The summer blights of corn, and other crops, are owing to this cause, the plants standing too close ; in this case the hot sunshine following large showers, blights whole fields. The caution to be given the farmer is, that he plant all his crops thinner than the usual custom : this we have recommended to him already, and have shewn him that his produce will not be less, but greater for it. Particularly where the place is most close, the distance of the plants must be the greatest.

This caution recommends the horsehoeing husbandry as a cure for blights, and indeed there is none so certain. Whoever saw a field of any crop treated in this manner, blighted : 'tis not only the clearing the ground between the plants, that gives them this advantage in the horsehoeing husbandry, but the affording them more nourishment, helps greatly. Starving and blighting are distinct things ; but a starved plant will be sooner blighted than one that is strong and flourishing.



If we would be assured of the truth of what is here advanced, respecting the cause of blights, our eyes may be made evidences. Let any man look into a hop ground on a sunshining day, after great showers. In the middle of the ground, and wherever the plants stand close, he will perceive vapours rising in abundance, and hanging with a quivering motion among them like a light smoak, where there is no wind. Let him examine whether there be these vapours about the outsides of the ground, and he will find there are not. All is there clear, because the access of the air is free, and they blend among it as they rise. Blights and fire blasts follow in the middle and close parts of the ground, and not on the edges: they come where these vapours have been seen hanging; and no where else. Therefore we must conclude these vapours are the cause.

The remedy is easy. Let the air have free egress as well as ingress among all parts of the crop, and no blights will be found. This is best obtained by the horsehoeing husbandry, but any method of keeping the plants at a distance, will answer the purpose.

In those particular blights which fall upon only a single plant, the origin is also an undissipated vapour. If it be asked, whether little parcels of such vapours ever hang about in the air, those who use telescopes can tell us they do. 'Tis not easy to distinguish them by the naked eyes, but when those curious persons use these glasses, they often disturb the sight. One thing that confirms the opinion of these partial blights happening from such little parcels of vapours is, that they generally come when there is no wind. Wind would break and disperse them.

## CHAP. XX.

### *Of damages by easterly winds.*

**T**HERE are spring blights of the same nature with those of summer, the effect of scorching vapours stagnating in the air, and heated by the sun. But beside these there are two kinds of damage done by easterly winds, and by late frosts, which, though called by this name, are distinct in nature: easterly winds in spring knip and destroy the tender shoots of plants, by stopping the current of the juices. When the juices are stop'd they swell the young fibres, and the leaves burst and wither. The juices gush out, and become the food of numerous little insects. Wherever there is food for these creatures, nature sends them in great number; and in this case there are presently seen abundance of them on the decaying shoots.

Insects are always found upon these damaged branches, and



by a natural error they are supposed to occasion the mischief. The farmer imagines the east wind brought their eggs, and he strews tobacco dust over the crop, or burns wet straw. He aims to destroy the insects, as if that would recover his crop: but he errs: the first step would have been to guard against the mischief, and when that has been omitted every following care is in vain. The east wind does not bring these insects, nor are they the occasion of the mischief: they hatch where there is food, and they feed upon the juices which these blasting winds have stopped in their current. These harmless creatures do not eat the leaves, or tear them; they find them burst, and feed upon what runs from their wounds.

The farmer may know when there is danger from these winds, their effect is by absolute drying up the parts, and the destruction is solely brought on that way. When there are moderate showers, or good morning dews, these eastern blasts do no harm. Therefore the farmer knows when he is to fear them. When he sees a dry spring, and the wind set in easterly, let him go over his fields and his orchard, and see what part of his crops are forwardest, for they will be in most danger. Let him not stay for the appearance of insects, but prevent if possible the effect of the blasts: this is to be done by defence and shelter. The use of thick furze bushes may serve for this purpose; and they should be stuck in the ground in close rows, not only on the side where this destructive wind is likely to come in, but in different places, at some distance in the same direction.

The cause is so different from that of a common blight, that the remedy is to be just of the opposite kind: in that case the wind is to be admitted among the plants, because it will carry off the vapours which are the occasion of the mischief: in this it is to be kept off, because it is itself the cause of the injury.

When he has sheltered a crop in danger on this occasion, if in any place he sees his plants hurt, let him thicken the shelter there: and having provided against the extending of the damage from the original cause, let him take care that it be not encreased by its natural consequences.

Insects which appear on plants nipped very much contribute to the spreading of the disorder. They breed fast; and that in a very particular manner. They do not wait the ordinary method of copulation of both sexes, but they are all breeders: and the young produced from them are full of others, which they discharge from time to time, and so on at least for several generations. This may appear strange to many, and it is one of those wonderful processes of nature, in which for particular



ticular purposes she departed from her usual tract and course. Mr. de Reaumur, of the royal academy of sciences at Paris, the Ray or Sloane of France, had the curiosity first to discover and trace this wonderful procedure, and many have since observed it: any one may, for the creatures are common enough; and if one of them be put into a little box and kept alive, it will produce its young; and any one of these young taken out as soon as born, and kept in a separate box, will do the same; and its young after it. The experiment has been continued through five generations. An accidental injury brings them to the plant, but they are capable of doing a great deal themselves. Having fed upon the juices that issue out of the burst vessels, they will pierce them in other parts in search of more: and thus the plant will be full of wounds. Out of all these juices will flow, and they will thicken and grow clammy in the air: and this being the proper food of these creatures; not only their own numerous brood will from time to time encrease the mischief, but this quantity of new food will occasion the repeated hatching of more and more of the same kind, brought in the egg or embryo as the first were, in the air.

Let the husbandman prevent the spreading of the mischief by destroying the insects, and spoiling their natural food. Winds occasion this mischief, and dry weather supports the insects: of all the methods devised for their destruction, none is so effectual as drowning them. The plants should be well watered every day, and this repeated constantly till natural rains fall. Rains destroy these creatures, and restore such parts of the plants as are not utterly spoil'd to their former vigour.

Nothing can be so proper, as to imitate this by art. Watering the plants will not only destroy many of the insects, but will wash off the sweet juices that hung on the leaves, and would have brought more: and at the same time will be remedying the dryness of the season.

Plants suffer in their shoots by these winds, because there is no moisture to prevent their shriveling up: and by this means that moisture, so needful to the ground, is given by the hand of the husbandman. Watering them all over answers this purpose extremely for the time when it is doing; but the good effect is not limited to so short a continuance. The vapours rising from the wet ground soften the air, and the young shoots and leaves are kept in such a condition of moisture, as to resist the effect of parching winds all the succeeding day. Watering in an evening when the nights may be frosty, may be the entire destruction of his crop. He must for this reason water and wash his plants only in a morning.



## C H A P. XXI.

*Of damages by late frosts.*

**T**HUS one of the accidents which happen in early spring to the crops of the field, and which is improperly called a blight, may be remedied by due care: we now treat of another damage of the same season, called by the same name, but altogether different in nature. The unexperienced eye is pleased to see the early appearances of spring in the field; but the more judicious tremble. In our uncertain climate, nothing is more subject to destruction than an early shoot: we have frosts late in the spring, and these nip and destroy such early shoots. It is our happiness, when the seasons are more regularly separated from one another; when the winter takes its time, and the spring begins late enough to continue uninterrupted. When a crop of tenderer kinds has shot briskly from some early soft weather, the severe mornings that follow nip the tender leaves and they fall off, and not unfrequently the young shoots with them: this is a stoppage in the growth that is difficultly recovered.

Gardeners, whose blossoms and young fruit are injured by this accident, have recourse to a method of prevention which increases the disease. They cover up the trees with mats, and thus defend them from the present frosts; but they make the shoots by this means so weak, that they are sure to be destroyed by the next. If the farmer could any way imitate this practice, it would be by scattering straw or haulm over a tender crop: but without the utmost care, more damage would be done by this than good. If he ever should be tempted to follow this practice, he must have this covering scattered slightly on every night, and removed every morning. If it were suffered to lie on all day, the plants would be drawn up so weak, that they would be sure to be destroyed by the next frosts.

Let the farmer before he commits his crop to the ground, consider the dangers to which it will be exposed. Some of his crops are required early, and to others it is of little advantage. The earlier he sows, the earlier his crop will rise, and the sooner in spring it is up, the more it will be exposed to danger. Let him run the hazard, for none but such as will, have a proportioned benefit from their forwardness; and with respect even of these, let him be moderate.



## C H A P. XXII.

*Of damages from weakness and starving.*

**A**MONG the many disorders of plants, comprehended under the article blights, in the common way of speaking, one is that of weakness in the growth from some accident, which starved them.

The effect we see produced by a real blight, we sometimes also find attending this; and the account for it is very easy. In that case a thick vapour, by means of a strong sun, has shrivelled the leaves, and scorched the stalks: and in this a like accident happens from the want of nourishment. Those parts nearest the root are best supplied, and therefore are flourishing, while such as are farthest from that source of nourishment, wither, when there is not enough to feed all.

'Tis the same as in the human body: when the heart cannot drive the blood through all parts; those farthest from it suffer first, the hands and feet have the juices first stagnate in them; and in the same course in the plant the tips of the branches, and those other parts most remote from the root are first affected.

We name this for the farmer's strict observation; if he perceives all the tips of the stalks and branches affected; and few other parts, he may be sure the disorder is no blight or blast, but a stagnation of the juices in the extremities, for want of a fresh supply to force them on in their natural course. Although there is not a circulation of juices in plants, there is a continual motion forward. This is necessary to the healthful state of the plant; and wherever it ceases the part becomes diseased.

It is not strange this stagnation happens from starving. When the whole is in a flourishing state, the root takes in a great deal of moisture, which it sends upward in a constant motion, and this drives on the rest. When there is not enough received, and the plant is not vigorous enough to throw it up, this motion grows faint. The juices stagnate in the extream branches: and burst the vessels, and sweat out. This calls the insect tribe together. Their eggs or embryos are floating in the air; and wherever there is food they stick and hatch: and they breed abundantly. These come where there are corrupted juices; and their appearance is as natural from starving as from scorching of the plants.

When the cause is a defect of nourishment, and not a scorching vapour, the remedy is natural, but it is not easy to be applied in all cases. The farmer will here see again the excellence of the horsehoeing husbandry. This blight may always  
be



be remedied in that method, because it is in our power at any time to give the plants a supply.

It will rarely happen that a crop raised in the new husbandry is subject to this disorder, but when it is, the remedy is to send in the hoe plow, and tear up the ground to a good depth between the rows. This, giving the plants abundant new nourishment, the disease is remedied at once. The whole crop shoots strongly; and the little insects, whose food depends upon the starved condition of the plant, drop off.

When large growing plants are thus endangered in the common course of husbandry; the hand hoe must be immediately employed. There is in this case no clear interval for cutting deep into the ground, but what space there is between plant and plant, must be broke as well as it can at the edges and surface.

All the weeds will be cut up by the hoe. But let the farmer not stop here, probably the plants standing too close has occasioned the mischief. Or if not, no way is so sure to recover one half as to cut up the other. This will give the hoers leave to work more boldly, the earth will be more broken, and the air, dews, and rains better let in: the wind will be able to blow fresh between the plants also, and every thing will thus tend to their recovery.

Let not the husbandman grudge the part of his crop that is to be destroyed. The question is whether he shall have half or nothing. In the common plantations of the orchard, if the trees fade he must dig round with a spade, breaking the earth well, and throwing it in carefully and lightly: but in our method of planting distant for cultivating the land between, let him bring in the plough, bear very near the roots of every tree that is in this sickly way, press the plough deep, and make the share, as Virgil says, shine from the furrow. This will give new nourishment and new life to the plantation; and thus in every other article, where the mischief plainly happens from a starved condition, let him give the crop a more abundant nourishment, and make it shoot strongly. This done, he need not trouble himself about the insects; for when the cause is taken away, the effect ceases.

#### C H A P. XXIII.

##### *Of the nature of mildew.*

SOME have asserted, that blights and mildew are the same; but they neither are altogether the same in their nature or consequences; neither are the same remedies or precautions proper; therefore this is a very hurtful error.

Others



Others in the vehemence of exposing their error fall into another of as bad consequence. They say they are not at all alike in cause, or in their nature. This is palpably a mistake; for they are alike in some respects, though they are not the same.

We shall endeavour to set the husbandman right in this important article; and in order to it shall refer him to what he sees in nature. The first step toward his arriving at the truth, must be his understanding the errors which have been delivered to him as the real accounts of the accident. Nothing can set the common class of writers in a meaner light, than the observing in the present instance how they have transcribed mistakes, and copied unmeaning words from one another.

Old Markham fetches mildews from the heavens. He attributes them to baleful influences, and malignant vapours of the sky; which striking to the earth alter its sweet and pleasant nourishment, and change it into bitterness and rottenness; whereby the corn is slain outright, or rendered withered, lean, and all unkindly\*. This doctrine passed for current, till the succeeding days of Worlidge, who searching nearer home for the disorders of his crops, attributes this to a fat and moist exhalation from the flowers, and other parts of the vegetables, condensed by cold in the upper region of the air, and thence falling upon plants again†.

The language of Markham is florid in his uncouth way: that of Worlidge is familiar enough. In general, the farther people in these studies deviate from plain language, the farther they depart from utility: these are writings meant to inform the mind, not to please the imagination. The fields may laugh and sing in prophecy, and Virgil may have beauty in his *interunt segetes*‡, for his georgicks are poetry: but these are not the expressions which should be used in laying down practical rules to the industrious husbandman, and explaining their uses.

Worlidge has delivered his plain, original conjecture, and many have adopted it; for Markham's was the error of his particular age, and could not be well received in any other.

Industrious Mortimer has copied honest Worlidge, not his thoughts only, but his § words; not so much as attempting to reason, or improve upon him. Worlidge, though not exactly right himself, yet laid a foundation on which a little plain sense and good observation would have arrived at the whole truth.

From Mortimer, Chomel translating this imperfect account, † conferred a lasting obligation (such were the words) upon

\* Book 2. p. 81.

† Syst. Agriculturæ, p. 209.

‡ Book 1.

§ Art of Husbandry, b. 7. p. 303.

† Dict. Oeconomic.



his country; and from Chomel 'twas englisht back again, under the auspices of Bradley \*.

Thus we see how many write, and how few think: how error goes the round of different nations: that which was old in Britain, after it had appeared new in France, grew new again at home, in the translation of that first translation. From these, unaltered, unimproved, and unamended, the account made its way into the compilations of Chambers † and of Miller ‖; and from thence into the patched productions of still later writers below contempt. This is what the farmer meets if he have curiosity to read for information. The first rational advance he is to make toward truth, is, by seeing the errors and the imperfections of these accounts; and the next is, to read it in the book of nature.

#### C H A P. XXIV.

##### *Of the real cause of mildew.*

**T**H E first accounts of mildew were erroneous, and the latter imperfect. It is not true that mildews are sent down from the clouds; nor can they ever be understood by those who join the exhalations of the earth and those of plants together. Let the farmer look out into his fields, and when he sees a settled mildew on his crop, he will find insects, as in blights, feeding upon a honey-like moisture lodged on the plants: where it is but beginning, he will find this moisture tho' less thick, yet sweet and clammy, covering the young shoots, though the insects have not found it. This shews him, that the cause of mildew is the hanging of a thick sweet moisture on the plants; here is his first step to the true knowledge of the disorder; the next is to enquire whence this liquor comes: not from the clouds or skies, according to Markham; for only pure and simple water can get thither, nor did any thing else ever descend from thence: neither can such a juice rise from the earth, as Worlidge fancies, for there is none such there. Waters may be impregnated with minerals, and their virtues may rise with them; but there can be nothing of the honey-kind raised from thence. The earth can send up nothing but what it has, and it has not in it the sweet juice which occasions this accident.

Let the husbandman inform himself what this sweet liquor is; it is but one thing in whatsoever form it appears. Whether it be solid or liquid it is the same substance; and it is the same whether we see it in the form of honey from the bees stores, of manna from the ash trees, or of sugar from the reed.

\* The same work translated into English, article mildew.  
dia.

‖ Gardener's Dict. article mildew.

† Encyclo-



We see there is such a substance in nature, and but one such ; and, to understand this disorder which it causes, let us enquire whence it comes. It is not dropped down from the heavens, nor drawn up by the sun from the ground ; this we have shewn : there remains but one way it should come, and therefore that must be the true source of it. Since it is not originally in the earth or air, it must be produced in the bodies of plants ; and that is its true origin.

The juices of the earth are received into roots ; and these are only water and the fine part of mould, and of manure. They have nothing of this sweet taste, nor of the honey or sugar nature. They are received into the vessels of the plant, and there, by an operation to be admired, not to be understood, they are converted partly into the solid parts of the herb, and partly into these sweet juices. We know this is done, but we cannot enter into the secrets of nature so far as to find how. Let the farmer, more humble than the philosopher, be sensible of this, and know where to stop his enquiries. It is enough for all useful purposes, that he knows this juice is there. This is extracted by the bees from their flowers, in its proper form, and lodged in their combs as honey. From the sugar-cane, the juice being boiled down, leaves it in form of sugar ; nor is that peculiar to this plant : the juice of the maple is, in some parts, boiled to sugar, in the same manner ; and that of the birch, or any other tree, or plant, properly managed, may.

This juice, which is separated in the flowers, or lodged in the sap, may shew itself on the outsides of the leaves and branches. It does this on the oak in our country, and is there called honey-dew ; and in Italy on the leaves and branches of the ash, and is called manna. This is the circumstance that comes nearest to our present purpose. In the course of nature this sweet liquor should be kept among the sap, except the little that is separated in the glands of flowers ; but in these instances it will shew itself in a separate form on the leaves. It is not the oak alone in our kingdom that has this honey-dew upon its leaves ; nor is the ash the only kind that has it, in hotter countries, in the shape of manna. The manna of Briancon in France, is gathered from the larch tree, and that of Persia from the Alhagi, yet these are both true and genuine manna.

This juice, which is thus contained in all plants, may by accident be brought out to the surface, and being there dislodged, it will shew itself first in a clammy moisture ; and afterwards, according to the various circumstances, in a tough matter like honey, or in a dry and firm substance, as manna. Experi-

ments



ments have proved that the French manna did not come from the clouds, but was the real sweet juice of the plant. Boughs have been cut off clean in the manna-season, and the manna has been found upon them some time after, though they had lain within doors.

This, and other observations, shew the sweet thick substance found on plants, is not raised from the earth, or dropped from the sky, but is sweated out by the plant itself. Trees can bear this better than tender herbs, and to this is owing the difference of its effects, in not hurting the one kind, and injuring greatly the other.

### C H A P. XXV.

#### *Of the accidents which bring on mildews.*

**T**H E reader will see from this account of the cause of mildew, what is the difference between that and the blight: that is occasioned by a condensation of the juice of the plant within, and this from a sweating of it out. Though they are not the same disorder, they are allied in their nature; but as their causes are different, so are their methods of cure.

The cause of blights is often a cold wind; but the occasion of mildew is frequently a hot sun, and a calm. This agrees with the rational account of these accidents; for cold is most likely to coagulate the juices in the vessels, and heat to draw them out. The weakest trees and plants are most subject to blights, because in them there is the least force of nature to carry on the motion of their juices: but, the richest and strongest are most subject to mildew, because they bear the most abundant juices. Where most manure and tillage are used, the plants will be richest: therefore where there has been most dung used, the crop is most subject to mildew.

Let the husbandman keep in mind the distinct nature of the blight and mildew: they require a different kind of caution; and in starving his crop to prevent the one, he may run it into the danger of the other. There is at all times a great quantity of moisture exhaled from trees and plants, and this, when there is not a due supply, may occasion both the accidents of blights and mildew; the first in the spring, the other in summer. It is the opinion of Dr. Hales, that when the moisture is exhaled from trees, in a cold spring, faster than it is supplied from the root, this occasions that blight in which we see the blossoms and leaves\*: and, on the other hand, when in the heats of summer the quantity exhaled is vastly great, and the plant is

\* Vegetable Staticks. vol. I. p. 368.



rich in these sweet juices, they may be drawn out when there is not a sufficient supply of the others; and this the more, the greater the heat is, and the richer the ground has been made by manure.

This is an accident which often happens without damage; but when the weather is less favourable there is great mischief: this being the real cause of mildew. In the heat of the day this sweet juice comes out; and while the heat continues it is not much perceived. It must have been rendered thin, in order to its getting out of the vessels; and the heat which effected that change, keeps it in the same condition.

At sun-set this juice would thicken from the cooler temperature of the air; but then the dews cover the surface of the plant with water; this blends with the thick juice which lies on the leaves, and washes it away. Whatever has been once dissolved in a watery liquor, will readily dissolve in it again; and as this thick sweet matter was originally mixed with the watery juices in the vessels of the plant, it naturally and readily will mix with the dew, which is also watery. This is philosophy, and this is truth: the plainest words best convey knowledge.

The farmer sees the natural and proper course of things, and in this there is no accident. No mildew is seen upon the plant, though the honey juice has been exsuded, because it has been washed off again before it had time to do mischief. If it had lain longer, it would have spread itself over the surface of the plant, stopped up its pores, and spoiled its growth; and it would have invited insects to feed upon it, which would have spread the mischief farther.

There are nights in which there is very little dew; and, in this case, as the thick juice will remain on the leaves, there is the foundation laid for the disorder: but there are yet chances for the crop's escaping. If a shower falls the next day, it will wash away all, and there can be no mischief: if this do not happen, there is the chance of another night of dew, and this will still take place. Even a third night's help from dew, after two dry ones, will answer the purpose if there be a brisk wind in the morning; but if otherwise there commonly comes on the damage. A wind, whether after rain or after dew, is of the greatest service against this disorder; and it is for this reason corn, in open fields, escapes more than in enclosures.

The husbandman will now understand the two fundamental points, 1. What is the cause of mildew; and 2. What are the accidents that bring it on. He will therefore have a rational foundation for his practice in guarding against the disorder, and



in endeavouring to remedy it, when it shall fall upon his crops in spite of all his caution.

## C H A P. XXV.

*Of the prevention of mildew.*

**W**HEN his land is rich, and his crop strong, let him be upon his guard to perceive this accident if it happen, that it may not be gone too far before he attempts a remedy. Let him provide against it by making his enclosures larger for corn land than for pasture; and by leaving openings at certain distances, at the height of about five foot.

This is a new practice, but it is of great importance. It may prevent half the mischiefs that happen to crops of corn in enclosed ground. We have shewn, speaking of blights, the necessity there is of the air having a free passage; and this is more or less obstructed by enclosures. The winds that hurt a young crop come in only from certain quarters, these therefore may be defended thicker than the others: and the high opening we direct in other places will give all the advantage of winds without their damage.

When this is done there will be much less danger of mildew than on other occasions; but as it will happen sometimes in open fields as well as enclosures, this can be no absolute remedy. When the days are hot, and there is little wind, and the nights are without dew, the farmer is to watch for fear of being surprised by mildews. He will find when the mischief begins, and he will perceive this thick juice sticking to the stalks, leaves, and young ears of his corn. It will discolour them, and he will find it first by his eye and then by the touch, for it will stick to his fingers. The consequence is, that the crop withers; the vessels that should take in moisture from the air, as well as throw out the abundant juices of the plant, are stopped up, and the proper course of nature is obstructed. We have shewn in what manner trees and plants are kept in a healthful state: this free passage of their leaves, and the rest of their surface, is a vast article in their œconomy. The top of the corn plant usually suffers most by mildew, and if it remain any time, though it should afterwards go off, yet the corn never ripens kindly, and however the useless part of the plant thrives, the ear will be light.

It is of consequence to know when this accident happens, because whatever remedy is in the farmer's power must be applied in time, otherwise the mischief will remain even after the apparent cause is removed. The field being known where mildews are most likely to happen, there must be caution used accordingly.



cordingly. As wheat is more subject to mildew in these places, than other kinds of grain, and as the freshness of manure makes it the more liable to the accident, no small enclosure that has been newly dung'd, should be sown with wheat: it should in these places follow some other crop.

Of all the kinds bearded white is least liable to mildew; this should be sown preferably to any other, in places where the mildew is likely to happen. The reason of bearded wheat escaping is, that its juices are thinner, though they be equally rich; so that when they are drawn forth by the sun, they do not hang upon the plant in that clammy manner.

This shews the method of attempting to prevent the same accident by art, by thinning the juices of the plant. Manures take various effects, and the two contrary are dung and soot. The juices of plants enriched by dung are the thickest of all others; and the juices of those enriched by soot are the thinnest, although the encrease in grain be as great from one manure as from the other. For this reason let the farmer manure with soot, where he has reason to fear the mildew.

Those reasons have always most weight which are supported by experience, and we have its authority in this case. Hertfordshire is the county where most soot is used as a manure, and no county is so free from this accident. The farmer will find the wheat which is sown latest most subject to mildew. He will find this the most essential of all means for prevention of the disorder. Mildews come usually at a certain time of the summer; and the corn that is tenderest is most subject to be damaged: when it has strength, this accident will not be able to take much effect. Of all the times in the year August is the best for this sowing.

In fine, if the farmer will give his enclosures air passages, sow his wheat at an early season after another crop, and with the advantage of soot dressing, he will need to have very little fear of this accident. It may happen at any time, but he will nine times in ten escape by this practice; and see his own fields healthful, while his neighbours are worth little.

## C H A P. XXVI.

*Of the remedies of mildew.*

**W**HEN the crop has, by neglect of the cautions here laid down, fallen under the misfortune of a mildew, the farmer is not to give it up as lost, but endeavour every thing for a remedy. The mildew is a clammy moisture, which stops the pores. Nature washes it off by rains, and blows it away when



dissolved in dew by winds. If rain and wind come soon after, the farmer has nothing to fear; but a few days if they do not will be of vast prejudice; therefore this is the time he is to seize for the doing himself service. If rain fall gently, and without wind, let him go into his field and see whether it have done the business: let him examine the corn by his sight and touch, and he will soon find whether the remedy has been effectual. If he find the clammy liquor washed away he may sit down in peace; but if it remain upon the corn he must prepare to assist in the remedy.

I have seen when a soft rain coming immediately after a mildew has been of the greatest disadvantage: the mildew has only lodged upon the tops of some plants, and on the stalks and leaves of others in small parcels, corrupting them in particular spots. But such a rain has dissolved the thick juice without being able to carry it off. It has spread it in a kind of glazing over the greatest part of the plants, whereas naturally it would have only affected a few places. This is the worst sort of mildew; and in this case art is to be called in.

Let him send stout and careful fellows in: let each of these cut a long, pliant, and well tufted ash bough, and leave all the branches, shoots, and leaves upon them, except a few that may be cut off, for the convenience of handling them. Let these men divide piece by piece the whole field between them, and let them sweep off the wet and mildew together, with soft strokes of their ash boughs. These, with their leaves, will make a kind of brushes, which will sweep off all without breaking a single stalk. The strokes are to be made first very gently down, and then with a slanting upwards, carrying on the boughs a yard or two before they are brought above the tops of the plants.

When a mildew is seen upon the crop, and there comes no rain to wash it away, the first consideration is, whether there be a favourable dew. In this case the same assistance may be given by art, as in the other; and the damage prevented. A brisk wind, blowing early in the morning, will carry it off: but, if there be none, some such course must be used as in the former case: but as the dew hangs in larger drops, it will be easier dislodged, and therefore a shorter method may be taken. To this purpose, a couple of men must be sent into the field an hour before sun-rise, with a long cord; they must walk in the furrows at the distance of the length of the cord; and one holding one end, and the other the other, they are thus to draw it over the crop: this will lay so much hold, as to shake off all the dew-



dew drops ; and the clammy juice will go with them.

This is a short method, and rarely fails ; no injury is done to the corn, and the clammy juice, thus scattered on the ground, serves as a kind of manure ; for nothing is richer, and the whole gets to the root. The boughs or the cord serve in the place of winds, to shake off the water in which the mischievous matter is lodged. But sometimes there may want also water. There may be no showers, and the nights may yield no dew : this is a condition nearly desperate : no brushing will dislodge the clammy moisture, when it is not dissolved first ; and even the strongest winds would, in this case, answer no purpose.

If the crop be of small extent, and there happen to be a pond near, the owner may sprinkle over the whole with an engine, with a fan full of small holes at its top ; and, after this, the boughs or the cord will answer the purpose. Thus the mildew may be diluted and cleared off, by means altogether artificial : but there seldom are opportunities of doing it : indeed, never in the full extent in large concerns.

Corn is not the only crop which may require the husbandman's care in this particular ; all kinds are more or less liable to it, and he is to watch in every instance. Hops are no more exempt from mildew than other growths. There is no crop needs more careful watching. As soon as the least appearance of it is perceived, after a shower, if any falls, or, if not, early in the morning, while they are wet with dew, let them be well shook, poles and all ; if this do not prove sufficient, let them be brushed with the ash boughs : it will be easy with these leafy brushes to wipe over every part, and not bruise any. When there is rain or dew, this will be sure of success ; and when there is neither, the engine must be called in to sprinkle the plants. This may be done conveniently and easily in a hop-ground, though it can scarce be performed in a corn-field of any extent ; and it will be very well worth the labour, because it will answer a double purpose : it will at once clean the plants, and water the ground. This is always useful, in the highest degree, to hops, when the season is dry toward the time of their growing to ripeness : frequently it will happen, that the produce shall be greater after this, than if no such accident had happened.

#### C H A P. XXVII.

##### *Of smuttiness of corn.*

**D**R Y summers are the most subject to mildew ; and, on the contrary, corn is most apt to be smutty in such as are cold and wet. When the wheat is smutty, the grains, instead of



containing a fine white flower, are full of a black powder of a disagreeable taste and offensive smell. This debases the value of the grain more than any thing, and is apt to continue when it has once got footing. Sometimes it altogether alters the colour and quality of the flour; sometimes it only affects it in part; but the least article is much to be dreaded.

Nothing is more essential to the husbandman than to know the causes of these accidents; nor is any thing more difficult: for those who should inform, are too apt to mislead him. We have shewn him how, in blights and mildews, those insects, which come to feed upon the juices, are supposed to be the cause: and the case is the same here.

Mr. Bradley accuses the east wind of bringing insects, which occasion this damage, by eating up the proper juices of the corn, and mixing their own with it: and long after Mr. Turberville Needham shewed the royal society, that in all smutty corn there were such animals.

Wherever there is a corruption either of animal or vegetable substances, these insects are to be found, but these writers take the effect for the cause. The maggots hatched from the eggs of flies in putrified meat, are no more the occasion of that putrefaction, than the worms found in smutty wheat are of the smut. The decayed state of each kind affords nourishment for these animals; and wherever there is place and food, pregnant nature sends them. Their eggs fly about innumerable in the air, and though millions perish, those which happen to lodge where there is a proper place, will always live, and they will be enough to propagate their species, and continue the mischief.

If the farmer supposed insects were the occasions of smuttiness, and that an east wind brought them, he would plant out the annoyance, and defend his fields against that quarter. But he would not be the safer from smut from this precaution; and nothing is so prejudicial as depending upon a wrong method.

The more learned say insects are the cause of smuttiness; and those of the plainer class attribute it to the soil: but here the husbandman will be as much perplexed as ever; one saying it is the over-rankness of the land which occasions the disorder, as Mortimer; another, that its poorness is the cause, as Blagrove; and some attributing it to both; as those modern compilers, who have collected without examination, and wrote down without thought, the words of one author at the beginning, and those of another at the end, though exactly contradictory. Others lay this accident on the conduct of the farmer: some tell him, that laying rotten vegetables on the ground, by  
way



way of manure, is the occasion of smut in the wheat, as Worlidge; and others that smutty seed raises a smutty crop.

Among this variety of sentiments, the farmer knows not which to credit: and wherever he fixes among them he will be wrong. We have shewn him what has been said, that he may avoid paying too much regard to it; and shall direct him, by his own observation, to discover the cause of the disorder; after which he will rationally proceed to the finding a remedy.

#### C H A P. XXVIII.

##### *Of the real cause of smut.*

**H**E will first see, on examining the nature of smutty corn, that there is a great deal of difference in the disorder, according to the degree of it. When in the full height, the whole inner substance of the corn is black, of a nauseous taste, and a bad smell. In this case, if the corn be bruised, and steeped in water, it presently shews innumerable worms, like little eels, living in every part of it.

When the disorder is not arrived to this height, the inner substance of the corn is not entirely hurt, but the outside is spotted with black; and, in some corns, a part of the flour within. The first is wholly destroyed; but the other may sometimes be recovered for certain uses.

When the husbandman understands this difference, let him recollect the circumstances of former years, and then examine the present: this way and this only will lead him to the truth. He will remember there have been certain seasons when a great deal of corn was smutted; and others, where very little suffered. He will find all those years, when there has been so much smutty corn, were cold and wet; and that those which shewed least, have been the hot and dry.

This first principle then will be established in reason, upon the testimony of experience, that a cold wet summer is the principal cause of smuttiness.

England is more subject to this than any other country; and it is owing to our frequent wet summers.

In Egypt no age ever saw a black grain of corn; for they have no rain: and even in Italy it is little regarded now; and was so slighted in earlier time, that the Roman writers have not a name for it. Modern writers, in that language, use for it words which properly express blight and mildew: to both these the old Roman fields were subject, therefore they have terms to express them; but this was little known, and less regarded.

In a wet summer, let the farmer examine his own crops and his neighbour's, and observe whose corn is infected, and in



what degree. He will find a great deal infected in these summers: and that most which is upon the poorest land, and the wettest. These are the two things that concur with an unfavourable summer, to occasion smut, and he need look no farther for the real cause.

In most grounds there will be some smutty ears in such a season; but in these most; in proper and well managed land he will see but few, and those smutted but imperfectly; a small part of them will have the disorder in its full force, having the corn converted to a black dust, the rest will be only here and there spotted on the surface. Next let him examine a poor land, not particularly wet, and he will see most of the corn there specked and spotted, tho' but a small part is absolutely rotted with the smut; but in a field that is poor and wet both, he will find it perfectly smutty.

This will be the natural result; and he will no longer attribute the disorder to insects or east winds. He will perceive in the same kind of soils a great difference in the degree of the disorder, and this will lead him to examine into the occasion; which he will find to be the better management in sowing: and the change, or the preparation of the seed. He will know, that neither the richness of the land, nor any kind of manure, are the cause of smuttiness; and he will not be afraid to enrich his land in general, nor to use any kind of manure in particular; but will know, that the season is the great cause; and as it takes most effect on the poorest and wettest grounds, he will bend his mind to the draining and enriching those lands; and will consider that every thing which impoverishes his ground is a cause of this distemperature; and every thing that puts it in heart, a defence against it.

#### C H A P. XXIX.

*Of the preventing of smuttiness by a due care of the land.*

**T**O prevent smut every thing is to be done that can give strength to the crop. The two chief articles are tillage and manure; and of these great tillage is best for the preventing this disorder. I have seen lands, where no care about the seed and other articles could prevent frequent smutty crops, which have yet been cured by repeated plowings.

As smut may arise from these several causes, too abundant moisture, poorness of the land, and an ill conduct in the sowing, let them be severally guarded against: every thing the farmer does to prevent smut, will also enrich his land. He will by this rational conduct not only secure to himself a cleaner but a larger crop. If his land be poor let him use the several methods



thods we have before related for the improvement of it ; and if liable to wet let him lay it high, and cut the furrows deep and in proper direction. This we have explained at large already, so that it needs only be named here.

As a great deal of tillage is the best way of enriching land to prevent smut, it follows that the horsehoeing husbandry is particularly calculated to prevent this damage ; and this is confirmed by experience. Land managed in this method is not nearly so subject to smutty crops, as that in the common course of husbandry. As we no where recommend fallage alone, it is needful here to speak of the kind of dressings that are most proper with it.

As dampness has a great share in occasioning smut, he should chuse the dry and warm manures : fresh dung is the worst dressing for a piece of land inclined to smut ; and of all that can be chosen, lime is the most proper. There is no part of the kingdom so free from smut as Derbyshire, where they use a vast deal of lime ; and in general, places where it is most common, are those in the neighbourhood of great towns, where there is abundance of dung.

#### C H A P. XXX.

*Of the prevention of smut by the conduct in sowing.*

**T**H E crops which are most subject to smut are such as are starved, and such as are chilled. The farmer will recollect that there is, beside those we have named, another article which always tends to impoverishing a crop, which is the sowing the same seed again and again upon the same ground. Whatever tends to impoverishing the crop, tends in the same degree to the subjecting it to smut. The change of seed wheat is easy, because it is every one's interest : as the farmers of different parts are to be mutual gainers, they will be ready at all times to do it.

There has been an opinion, that smutty grains will grow up into a smutty ear : but they will not grow at all : however, they will do as much damage in the ground as if they did : they will spread the infection of their juices in the land, and produce the same effect. The smutty grains break and dissolve in the ground, at the same time that the others swell and shoot out their roots : when these are taking in their first nourishment, the rotted corns of the smutted kind afford their juices to them : they take in this, and it gives a tendency to smuttiness in the whole.

This will stand as a caution to the husbandman, that when he sends corn in exchange, he does not for his credit sake send  
such



such as has any smut among it; and that when he receives seed corn from another, he look it carefully over, before he prepare it for sowing. Clean seed is so necessary on this occasion, that he should not suffer a grain to be sowed that has the least speck upon it; nor any that has been washed or otherwise cleaned; for it is not certain, that any cleaning of grain once smutted, can make it fit for this purpose.

Nothing can prevent a piece of wet ground sown with smutted corn from being smutty; but a crop that would have been liable to this accident from any apparent cause, will be more likely to escape, if the seed have been changed. This always makes the growth, under equal circumstances, more vigorous; and the heartier it is, the more safe from this accident.

Change of seed is a very good method; but the other precautions we have named have a right to the same regard. Every change of seed will be of service, both against smut, and in favour of the growth; but the nature of this exchange being well considered, the advantage may be doubled. The soil makes a great difference in the condition of corn for sowing.

Wheat that has grown on dry sandy ground, never succeeds so well as that from other soils. As the sandy is the worst land for getting seed wheat for a change; the best is the clayey. This will thrive in a land of the same kind, or in a loam, or even in a sand.

When the soil is clayey to which the wheat is to be brought, none is so proper as one of the same general nature; but it should not be in every respect alike, because that will be like sowing the same corn upon the same land: the colours of clayey soils shew their differences: and by them we may judge.

A white clay is the best soil to take seed from that is to be sowed on a red; and a black clay furnishes the best wheat for a yellow: in the same manner, interchangeably, the wheat that has grown on yellow is good for black; and that from red for the white. In general let the farmer get his seed from a sound soil at a distance from his own land; and if he can, let him get it of some one who changes it yearly himself. Seed of this kind sown on land prepared as we have directed, will be secure from smut.

In the common course of husbandry, the changing the crop upon a piece of land, is a needful caution to prevent smut. This depends on the same principle: often sowing the same crop makes it weaker; and where wheat is weak, any unfavourableness of season will make it smutty. In the horse-hoeing method this change of the crop to the ground is not necessary, tho' a change of seed from some other place is. In this new method,  
though



though the same field be sown with wheat ten years successively, the growth will never be any two years in the same place; so that while the crop is enclosed in the same hedges, yet it annually grows in a different parcel of the ground. This is sufficient; for if the seed be changed every year, though the same field be thus sown with wheat ever so long, not an ear of it will be smutty.

## C H A P. XXXI.

*Of preparing the seed against a smutty crop.*

**T**HE steeping of seed corn is in no article more serviceable, than in preventing smut. When the former precautions have been taken for the procuring the right seed, and dressing the land, if this be added there is little fear of success. In general, the earlier wheat is sowed, and the better it is steeped, the less it is liable to be smutty. Early sowing makes the growth strong, and the advantage of steeping is the same; for it makes the crops more vigorous.

Of the various methods that have been proposed for brining of seed wheat, the plainest and most familiar are best. Receipts are published abundantly, in which copperas and allum, and urine, and the like offensive ingredients are recommended; but this is the act of fancy, not of judgment. Men think they shew the more skill, the more ingredients they crowd into the liquor; as those old physicians, who in the composition of Mithridate and Venice treacle, seem not to have considered what would be best for the purposes of the composition, but how many things they could get into the prescription.

We would have the farmer understand the design of every thing he does, and he will then find all this parade is quackery, the jargon of a stage doctor to conceal ignorance. Those who do not know which ingredients used in the several receipts for steeping are best, put in all, that they may be sure to have the right among them: but the intelligent farmer should know the intent of each, that he may be able to chuse with wisdom on any particular occasion.

In the present case, all that he expects from the steeping liquor, is to give the plants a speedy and firm growth; let him therefore reject all those ingredients, which have been introduced for other purposes; and use only those which tend to promote the growth. These are two, salt and lime, and all others are to be rejected. Let him pour the seed wheat into a large tub, and pump a good quantity of water upon it: let him stir it well about with a stick; and then leaving it to settle pour off the water, and pour away all the light grains. Then let him  
pump



pump more water upon it, and stir it about; and repeat the same till it has been washed four times: by this means the wheat will be well damped and perfectly clean, and every light grain will be separated.

When the wheat is thus ready for steeping, prepare the brine in the following manner. Pump a sufficient quantity of water into a tub that has a tap to it, and put in as much salt, weighing what is put in, as will, when dissolved, make the brine so strong that an egg will swim upon it. This is just half the strength that is required; therefore let as much more salt by weight be put in, and then let all be well stirred about till it melts. When the salt is melted put in the wheat and stir it well about. Let it lie two nights and a day, that is, put it into the brine one evening, and it will be done enough by the evening but one afterwards. When it is taken out of the brine, let it be well covered with sifted lime, and then it is ready for sowing.

#### C H A P. XXXII.

##### *Of the cleaning of smutty corn.*

**I**F the farmer follow these instructions, he will have very little reason to complain of smut. But he may, before he gets into the use of this method of prevention, have a smutty crop, and we shall not leave him uninformed of the methods by which he is to make the best of it.

Those ears that shew themselves to be utterly rotted, should be picked out; and the rest when thrashed may be managed in the following manner. Let the whole quantity be put into a very large vessel, and water in abundance poured upon it: let it be very well stirred about in the water with a new birch broom, and this repeated several times with fresh waters, till all the blackness is got off, and the wheat looks like other corn, only for the wetness. Then spread it upon sheets, or any other cleanly way, to dry in the sun, and turn it from time to time till it be dried perfectly; after which it will be fit for use. This is not to be used as seed wheat, for the least remains of the smut would endanger the new crop; but provided the worst of it have been carefully picked out, there will be no harm in the using it for bread, or any other purpose.

Wheat when smutted to a great degree, is unwholesome; and should not be eaten; but when the defect has been moderate, and the worst is picked out, the remainder may be used without danger.

In some places they soak their wheat in water several hours, to get off the blackness, by rubbing it afterwards in the water; but



but when corn is so bad as to require this, it is, honestly speaking, too bad to use. In this case, as the water has penetrated the very body of the grain, the sun and air will not be enough to dry it. They for that reason put it to dry in a kiln, in the manner of malt, and afterwards sell it; but this every one should be guarded against, not only with respect of sowing, but for the common service, as the bread of families.

In respect of seed corn, that should be of the choicest and purest kind, so that any imposition upon the farmer in the selling for that purpose, is cruel in the highest degree. When he is obliged to buy his seed corn, he must be very nice in the examination of it; and he may discover whether any trick of this kind, more or less, have been played with it, by the sight and taste. Fine and perfect wheat should look shining, and all of a colour; if it be dim on the surface, or of different hues, it is to be suspected. The sweet taste of good wheat is also well known to the farmer, and no art can give this to such as has been washed.

In Flanders they go farther in cleaning of their wheat that has been smutted; they have a large hollow machine, made of plates of tin set in a wooden frame. These plates are all pierced full of holes inward, so that the inside is like the rough surface of a nutmeg-grater. When their corn is smutty they first steep and wash it carefully in water, and then, when it is somewhat dried, they put it into this machine and work and shake it about; the consequence is, that the black spots are in part grated off, and in part concealed; and this is sold for bread, and is often the occasion of great disorders.

The great article to prevent the mischief, is using a proper kind of manure, and a due quantity of it, with sufficient tillage.

Having gone through the care of the land, and management of a crop, nothing remains for the compleating this part of our work, but informing the farmer how he may best preserve his corn when he has reaped and thrashed it. This we shall give in the words of a correspondent, to whom we have been often before obliged on the most interesting occasions, and whose discoveries and improvements on this head demand the thanks of the publick, more than the labours of most other enquirers.



## A Description of a VENTILATING GRANARY,

*For the preservation of corn in a state of rest; with the plan and construction of it: also, some observations and directions about sound, and tainted or ill-saved wheat, with respect to their preservation in this kind of granary.*

*Principles upon which this granary is built.*

AIR, consequently dryness and coolness, duly administered together, with sufficient security against vermin, seem to be the essentials necessary to the most convenient methods of preserving corn, for all its uses, for several years together in a granary or magazine, without stirring.

N. B. A granary or magazine, on these principles, should not be built in a confined situation; as, near the shade or shelter of trees or buildings, but where the opposite east and west sides of such granary may be properly exposed to those points: in which case most of the intermediate points between them and the north and south, will act upon this granary more or less, according to the velocity of the wind, by fixing the folding-doors thereof properly, at such times when the corn is to be ventilated.

*References to the PLAN.*

Plate 1. Elevation of the granary or magazine to be built of brick or stone, of various dimensions, according to the occasions of the owner; but here (as a specimen) only 46 feet long by 17 broad, from out to out.

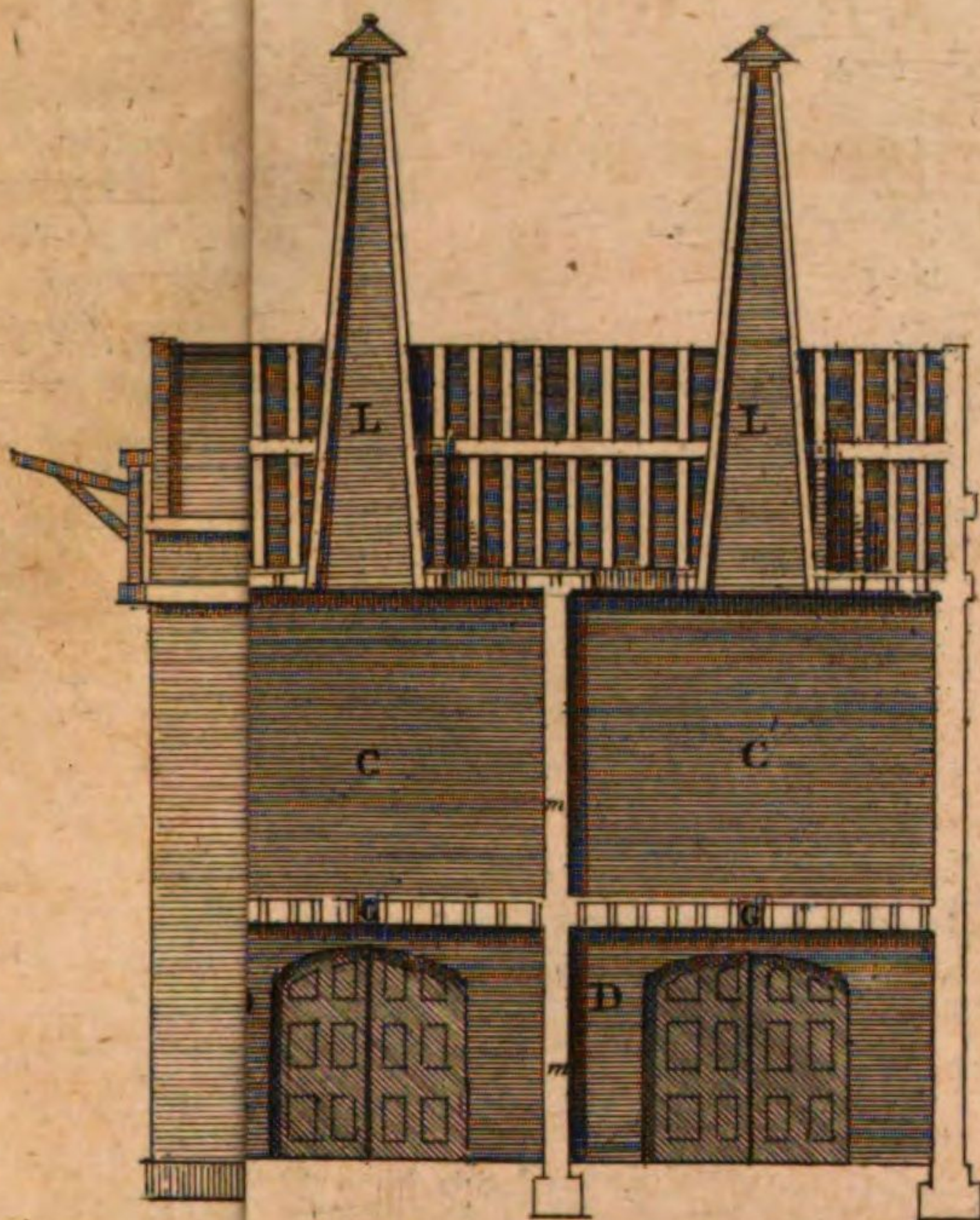
Plate 2. Section of the granary lengthways through the middle.

B. B. B. B. The garret, all in one chamber, into which the corn may be received by means of a crane, or pulley fixed over the door (k) (plate 1.) on the north gable of the building; to which door a ladder, or flight of stairs on the outside of the said gable may communicate. This garret may occasionally be made use of as a store room for corn, that has already been preserved two or three years in the chambers below, marked (C. C. C.) or for other kinds of dry goods, leaving a few air holes only in the gable ends of this garret story.

C. C. C. Three chambers where the corn is to be first repositied, in order to receive the necessary ventilations for a year or two, or more, till perfectly cured or sold; each chamber here, about 13 feet square, by 12 high; to be divided from each other by brick partitions (m.m.) carried up from the ground. The sides of these chambers to be neatly covered with stucco plaister.

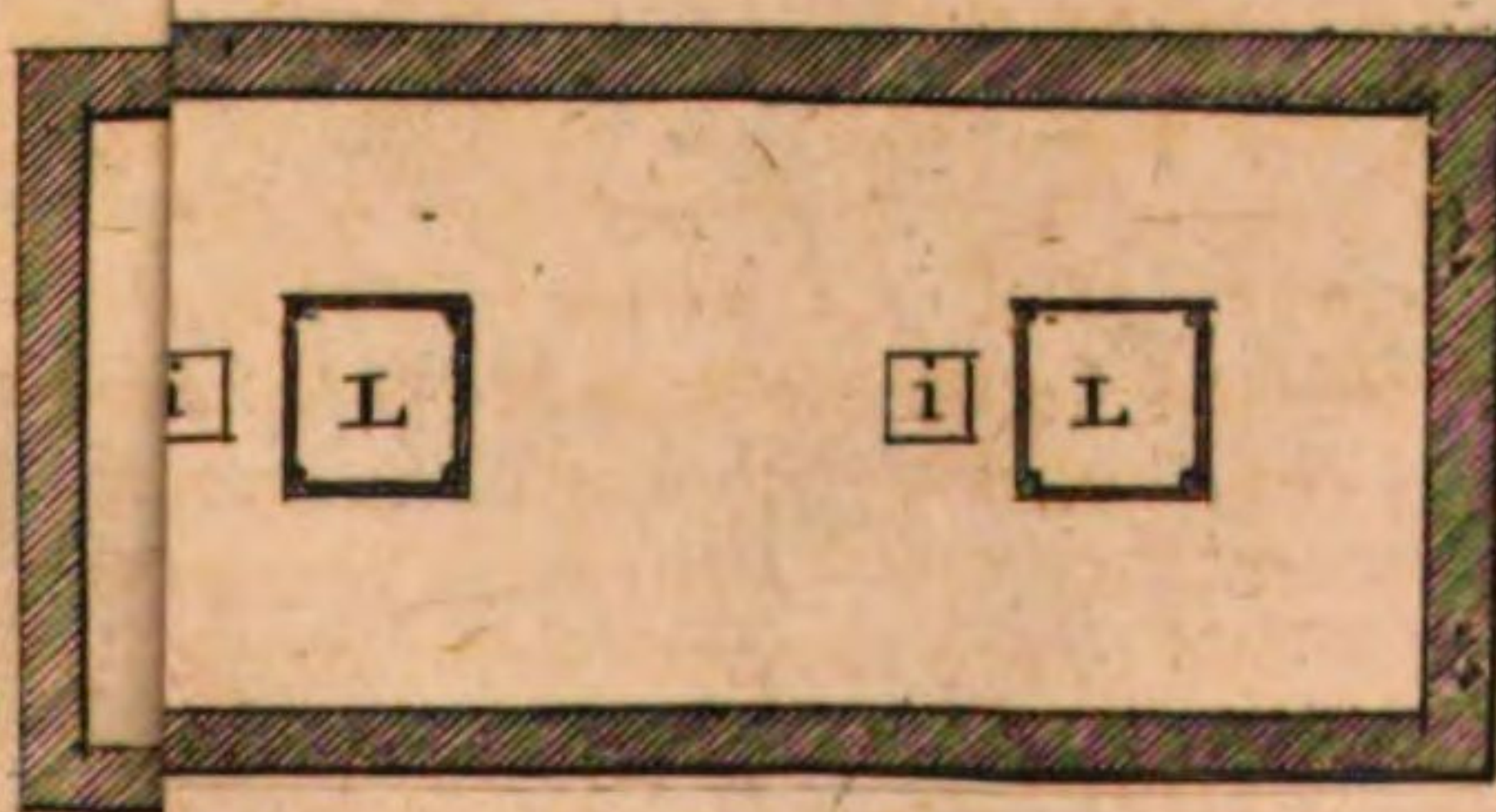
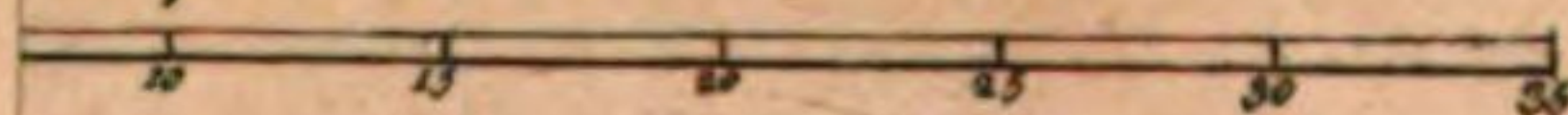
G. G. G. The floors of these chambers, to be supported with whole double deals laid edgeways, and covered with narrow deal boards,





Length ways through y<sup>e</sup> Middle.

Scale of Feet.



the Garret floor.







boards, not exceeding six inches in breadth, leaving a space of near an inch between each board, that room may be given for the air to ascend equally through these several interstices in the floors, in order to ventilate the corn contained in these chambers, as occasion requires. (vid. plate 3. fig. 1.) These floors, or at least the interstices between the boards, to be covered with close wire grating, that will not admit the grain to pass through; or the floors may be covered intirely with a proper thin, but strong hair cloth, nailed down round the confines of the floors, before the corn is lodged.

G. G. G. Small trap doors (vid. plate 3. fig. 1.) to be made a foot square each, one in the center of each floor; which may be opened occasionally, to let out the corn into the ground chambers for use or sale; and may at such times, if a brisk wind sets in and through the ground chambers, prove a good winnowing to such corn to prepare it for market, especially if the said trap doors be humoured by the hand, so as to let fall the stream of corn thin and diffused on the clean ground floors. These trap doors to be free from wire grating or hair cloth over their dimensions; to be affixed by hinges, so as to open into the ground chambers; at other times kept fastened with a cross iron bar staple and padlock, to prevent imbezement. The ceilings of the chambers C. C. C. must be made as much air proof as may be, either by some excellent close plaister ceiling, or only by caulking the joints in the garret floor above, pitching the seams afterwards, and dashing drift sand on the seams after the hot pitch brush, by which means no air can pass out of the chambers C. C. C. except throught the flues (L. L. L.)

L. L. L. - The flues, to be made of a piramidal figure, with beams erected at the four angles of each flue, well barred and braced together, and covered with laths and plaister, so as to be tight and air-proof; to be four feet square each at their bases, and well fixed in the garret floor, and to the roof timbers; to be erected directly over the trap doors (G. G. G.) and elevated twelve or fourteen feet above the ridge of the roof of the building; their openings at their tops to be a foot square each; a piece of brass net-grating to be fixed half an inch within their muzzles, to prevent sparrows or other annoyances descending to the corn below, and also to admit of a cover or valve, falling close on their muzzles. These muzzles to be well guarded from rain and snow by proper umbrelloes, elevated a little above them, and well fixed to the continuation of the four beams of the flues. The valves just mentioned to be made of square pieces of oak board, exceeding the square dimensions of the orifices of the flues, by two inches on every side; a plate of lead of five or six pound weight, to be nailed on the top of each valve; the valves underneath to be lined with buff, well soaked in pickle, to attract the moisture of the air, swell and stop close. These valves to be open or shut by means of a small cord, fastened to a very short cross sling of the like cord, which cross sling communicates, and is made fast to four staples in the four corners of each valve; that the valves may be raised and lowered evenly on their respective muzzles, by means of the small cord



cord passing over a pulley fixed under the center of the umbrello, and down between the lath and plaister; and the boarded lining of the flue comes out to hand in the garret, through a small hole in one side of the flue; which hole should be made through a piece of wood fixed in the framing of the flue; and the upper edge of the said hole, on the inside of the flue, should be guarded by a small roller of wood, to ease the friction of the cord upon drawing up the valve, and keeping it in that situation by a weight somewhat superior to that of the valve itself, hung to the cord end in the garret, or the cord may be made fast to a hook in the garret floor, making allowance for the lengthening and shortening of the cord by the weather, that it may not be in danger of breaking; these valves or covers should also be guided in their raising and lowering, by four fixed upright smooth wooden bars, which may lodge them equally on the squares of their respective flue mouths. These valves or covers might be contrived to be opened and shut by other methods, but this seems to be one of the most simple, and least liable to disorders and repairs. The chief use of these valves (and a very considerable one) is the keeping out the moist foggy air from descending upon the corn, when the granary is not to be ventilated.

i. i. i. Trap doors in the garret floor, for laying in the corn into the chambers C. C. C. to be two foot and a half square each, well fitted to their receiving jambs, and made tight with clay well tempered with salt and water, after the chambers are charged with corn.

D. D. D. The ground, or lowest chambers that should be admitted in a building of this nature, the sides of which to be smooth plaistered, that rats or mice may not be able to ascend to the corn floor, nor should any goods or lumber be admitted into these ground chambers, because they would diminish the diameter of the quantity of air to be admitted into them, and consequently of its weight and pressure necessary to force its way up through the interstices left in the corn floors, as before described.

E. E. E. Large folding doors to each ground chamber, opening outwards, which when set open and properly fixed may catch the drying side winds, and direct them into their respective chambers. The like folding doors to be on each side of the building, east and west, opposite to each other, so that upon ventilating the corn above, the windward doors only are to be opened; at all other times, when moist weather prevails, all the doors, as well as the valves before-mentioned, to be kept shut and close as possible; for which reason these folding doors are to be truly fitted to their jambs, as also to their upright center posts where they meet, bolt and lock, or by a strong cross bar and pad-lock on their outside; and the borders of these doors, at all their meetings on the inside, should have a list of buff nailed round them with sprigs, in order to prevent an indraught of moist and foggy air, as much as possible.

Mice and other gross vermin, will find great if not insuperable difficulty, to get admittance into this granary; and insects infesting it, may be destroyed by brimstone set on fire occasionally in the ground chambers,



chambers, keeping the folding doors, as well as the valves above, close shut at such times of stoving, and it should be well stoved before it be replenished with corn.

It is sufficient only to remind many people, that the acid fume of brimstone confined, kills all insects within its circulation, and no doubt discourages their approach for some time after; and may probably tend to abate fermentation in the grain, which is generally, if not always occasioned by superabundant moisture and heat.

REASONS offered for the operation and effects of this  
VENTILATING GRANARY.

When the dry ponderous air is directed into the ground chambers by their folding doors, and strongly pressed in by the continued impelling force of its own current; being there accumulated, it will endeavour to expand itself on every side, by its own elastick spring: and so passing through the interstices, before-mentioned, in the floor above it, as the least resisting vents will insinuate itself through the wire grating or hair cloth, into the numerous interstices between the grains of corn; through which its motion will be greatly expedited by means of the flues above, when open; as the air at their tops being above forty feet from the ground, will be much rarer than in the ground chambers below, where it will be greatly condensed by the pressure of the superincumbent atmosphere, and also by the impelling wind or current of air continually driven into the lowest chambers. The air therefore, always endeavouring to expand itself in the lowest chambers, to those parts where it finds least pressure and resistance, will continually tend from the lowest parts upwards, and so produce an adequate circulation of air through the whole bulk of corn, whereby it will be ventilated and kept cool, dry, and sweet, though in a state of rest, for several years together, and longer than the private owner should lie out of his money.

*Farther observations on the usefulness of this kind of granary.*

In this kind of granary, wheat may be lodged in bulk ten or twelve feet square every way, or whatever the square contents of the corn chambers be, the wheat may lie therein within a foot, or half a foot of the ceiling, but half a foot is a good distance at first laying in the corn, for it will soon sink lower as it dries. This is a vast advantage in stowage over the old granaries, where they dare not lay the wheat for a long time after laying it in, above eighteen or twenty-four inches deep, and that too, frequently turned and aired by hand-labour and expence, for fear of its heating, musting, and breeding the wevil; whereas this kind of granary, ventilated as it were, per se, and in a manner without any trouble or expence attending it, will preserve at least five times the quantity of wheat upon every foot of its flooring, more than the old-fashioned granaries can do.

N. B. The ground chambers need not be above seven feet high, under the floor timbers; and a brick floor, or one of clay, lime, and smiths dust well tempered together, is fittest for the ground floor.



In large military or publick magazines, greater bulks of corn may be supported by upright props under the floors, and the ventilation proportioned by adding more flues to each corn chamber, and proportioning the dimension of the folding doors thereto, or the number of them.

The author having never seen or heard of any granary of this kind in practice, submits it to publick scrutiny, censure, or improvement.

*The distinction and difference between sound and tainted or damaged wheat, and their different treatment in order to their preservation in this kind of granary.*

If wheat be dry and well saved at harvest, free from black, blighted, or sooty ears, has afterwards had its due sweat and melioration in rick, cock, or barn, for five or six months, and after threshing out has been well cleansed and screened; such wheat may truly be called sound, and when lodged in this kind of granary, may be easily preserved therein for many years, by ordinary and moderate ventilations.

For instance, being thrashed out in January or February after reaping, well cleansed, and lodged in this granary; it may be ventilated once a week, if opportunity offers, for the first two or three months in spring, which will be a great advantage to the grain, before the sultry heats of summer come on, when it should be ventilated as often as a proper breeze or gale of wind offers, and once a month, a few matches of brimstone set on fire in the ground chambers, as before directed; in the autumn, the winter, and spring following, two or three times a month may be sufficient to ventilate, without applying the brimstone fumes; but the second summer ventilate twice or thrice a month, and apply the fumes once or twice during this second summer; after which time it may be sufficient to ventilate once a month during the second autumn, winter, and spring, and twice a month during the third summer, when it may be said to be thoroughly cured.

It may not be amiss, during the first year or two after the wheat is lodged in this granary, to inspect the condition of the corn, by opening the trap doors in the garret floor, especially in summer time once or twice; for as moisture or vapour of the corn will always rise to the surface of the bulk, though the center may be dry, so the appearance of the surface, as to moisture or dryness, may regulate the number of ventilations necessary for its preservation.

It is certain from experience, that sound corn that has been well preserved in common granaries, by frequent turnings and winnowings, and afterwards laid two or three foot deep, or more, seldom sweats, gives, or ferments after the first two years, except it receive accidental wet or moisture, from which it is easily freed with a little care; whereas it is a long time parting with its natural internal moisture, which is the greatest enemy to its preservation.



It is no less certain that wheat, being well preserved by any method whatsoever, has, after several years so kept, been found to produce more and better flour for bread, than some of the same field and crop did soon after its being threshed out; because the aqueous humidity of the grain evaporating by keeping some years, the flour comes cleaner from its thin bran under the stone.

It is equally certain, that wheat so preserved for several years, has proved very good seed corn, and probably not so liable to produce the smutty ear; excess of moisture, either in the seed, the soil, or the seasons, being the chief cause of that grievous complaint, except the seed itself be smutty, and then the crop also will be smutty notwithstanding dry seasons.

But if wheat has been ill-saved at harvest, or be in a contrary condition, in any or all respects, to the sound wheat described above, which would certainly give it a strong tendency to heat and fermentation, in a bulk of ten or twelve feet deep, and so induce the weevil, and other maladies, to the further damage or destruction of the wheat. It will therefore, in this case, be necessary first to cleanse well by screen or tryer, after which give it a very gentle and slow drying upon a kiln, equal only to a strong sun heat, till the grain be somewhat hard under the teeth; then laying it on a floor to cool, for some hours, put it into sacks half filled and tied fast, and so rub the wheat well therein on a smooth floor with both hands, frequently turning the sacks over every way, in order to loosen and free the grain from its black sooty dust; then winnow clean, after which it may be laid into this granary ten or twelve feet deep, and there treated in every respect like wheat originally sound.

Such wheat, after such treatment, will turn out much better for bread, though kept two or three years or more in this granary, and sell for a good deal more money than it would have fetched in its first tainted and foul condition.

Yet such wheat, though by this method made proper for bread, should by no means be used for seed; for kiln-drying, more or less, abates or destroys its vegetative quality; and even without drying, a distempered seed seldom or never fails of producing a distempered crop.

J. STEVENSON,

End of the TWELFTH BOOK.



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A  
COMPLEAT BODY  
OF  
HUSBANDRY.

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BOOK XIII.

*Of the diseases of cattle, and their remedies.*

SECT. I. Of HORSES.

CHAP.

1. *Of the glanders.*
2. *Of the mistaken notions of the glanders.*
3. *Of the real situation and source of the glanders.*
4. *Of the causes of the glanders.*
5. *Of the method of cure for the glanders.*
6. *Of the liquor to be injected in the glanders.*
7. *Of purging a horse.*
8. *Of managing a horse with his physick.*
9. *Of the care in taking a horse up from grass.*
10. *For a cold.*
11. *For the sleepy evil.*
12. *For the gargle.*
13. *For a roughness of the coat and swelled heels.*
14. *For a ravenous appetite.*
15. *For the staggers.*
16. *For the farcy.*
17. *For the malanders.*
18. *For over-weariness.*
19. *For inward heat.*
20. *For a scurfy skin.*
21. *For sore heels.*

CHAP.

22. *For the cholick.*
23. *For convulsions of the bowels.*
24. *For cracks about the feet.*
25. *For swelled heels.*
26. *For a strain.*
27. *For running eyes.*
28. *For a film growing on the eyes.*
29. *For cramps.*
30. *For the anticor.*
31. *For sickness at the stomach.*
32. *For the yellows.*
33. *For the swelling of the spleen.*
34. *For a heat of urine.*
35. *For a difficulty of urine.*
36. *For bloody urine.*
37. *For the wibes.*
38. *For the soreness of the nostrils.*
39. *For a bleeding at the nose.*
40. *For disorders in the mouth.*
41. *For loose teeth.*
42. *For foundering.*
43. *For wind-galls.*
44. *For the anbury.*
45. *Of a general decay.*

The



The INTRODUCTION.

**W**E have gone through every article of the farmer's concern respecting the choice of his cattle, and the growth and management of his crops. We come now to consider those disorders to which cattle are liable, the methods of guarding against them, and the medicines most approved in their cure.

We have had occasion to observe, on many occasions, how greatly the farmer is misled by those who should give him information in respect of the management of his crops; but the present is an article less understood, and more injudiciously treated: and it is, at the same time, of the greatest concern. The loss of his cattle is not to be recruited but at a very considerable expence; and the care of them is, in general, committed to persons so ignorant, that little better than their absolute loss can be expected when they fall into any considerable disorder. They must have strength indeed, if they escape from their diseases, and such doctors.

While those who undertake the cure of these creatures are so ill qualified to succeed in it, the farmer is less able to judge right, than they are to act. It is a part of needful knowledge farthest of all removed from his enquiries. A few names of disorders got by rote, are generally the whole stock of the country farrier's knowledge, and these he applies to any disorder that comes before him; boldly, because he knows none can contradict him. A smaller store of remedies serves his purpose: his physic he uses as much at random as the names of disorders; and the unhappy farmer is stripped both of his cattle and his money. If they destroy the beast, he is persuaded the violence of the disorder killed it; and satisfies his mind that he has done all he could.

We shall deliver here nothing but what is the result of experience. We shall inform the owner what he may do for his cattle himself, and lay down such plain rules for the conduct of the farriers, that he will be able to know whether they act according to reason and knowledge. If they will study in the same pages, we promise them, they will find only truth: we request them to peruse 'em carefully, not only for the farmers sakes, but their own; and consider the harshness of what we have been obliged to say, as a just representation of their need for better information: 'tis one of those wounds that is necessary to be opened deep, in order to reach the cause; and they know these soon heal when proper methods are followed.

The horse is the most valuable creature in the farmer's stock,



both with respect to his price and use. The care of chusing, managing, and breeding this animal, we have delivered in a preceding part; but, in this place, he claims a particular regard, both for the frequent disorders to which he is liable, and the easy methods by which the greater part of them may be remedied, when they are rightly understood. We shall give directions for preparing the medicines useful on ordinary occasions; and shall enter largely upon the worst diseases to which he is subject.

## C H A P. I.

*Of the glanders.*

**W**E have taken for the first article of the diseases of horses, this which is the most important of them all, and, in general, the least understood. Many have called it incurable; and indeed, according to the old practice, it must have been so: for if ever a horse recovered under that management, nature must have performed the cure: it is impossible they should have assisted in it, who knew nothing of the seat or nature of the disease.

Of late years some persons of skill have undertaken the cure of horses; anatomy has been called in to assist in the operations; and dissections have been made of morbid bodies of that animal, to shew the cause, situation, and nature of the diseases. From this we have been made acquainted with the origin and true nature of the disorders of these creatures, and thence we may proceed properly to the cure.

With respect to the glanders, this was more wanted than in any other disorder; and it is very lately we have attained the knowledge. A farrier to the king of France's stables, his name Lafosse, made the discovery; and the royal academy of sciences received and adopted it. This is the true road to knowledge; when the most honourable assemblies will receive and give their sanction to truth, from every hand that offers it; and do honour to any one who can do service to the publick.

## C H A P. II.

*Of the mistaken notions concerning the glanders.*

**T**HE glanders is a running at the nostrils of a horse: first there is a whitish liquor discharged; afterwards, as the disease gathers strength, a brownish matter; and, last of all, a bloody water. All these are voided in very great quantities, so that the horse is offensive to the sight, and the discharge wastes him continually.

I

This



This disease has destroyed thousands of horses ; very few have escaped that were once seized with it : not that the disorder is incurable, but from a mistake, concerning its nature, none knew how to go about to cure it.

The reader will be astonished, that among so many conjectures as have been made about this disease, none came near the right cause ; and that people should search in the remotest parts of the body for the seat of a disorder, which was situated where it appeared.

The old authors supposed the disorder to lie in the brain : they imagined that, at last, the brains themselves run out through the nostrils, and to that attributed the death of the creatures : mistaken as such an opinion was, these were nearer the place of the disorder than many who followed.

The next conjecture was, that it lay in the back-bone ; and that the discharge through the nose proceeded from the marrow of that part. This was a received opinion many years among our farriers, and is so, in most places, to this day ; from whence they call the disorder, the mourning of the chine.

Later authors have supposed the disease to be in the liver ; some in the lungs, some in the kidneys, and others in the spleen : and the glanders has been attempted to be cured by diuretics and deobstruents.

Mr. Solleysel adopts all these parts as possible seats of the disorder ; and traces the matter by way of the cæliac vein, up to the head, where he supposes it is lodged upon the parotid glands, and thence discharged through the nostrils. This appeared so learned, that many thought it must be true : and on this was founded a practice for the cure, which, like the rest, was as ineffectual as the system was erroneous.

After this, the lungs were considered as the seat of the disorder. Others attributed it to knots and swellings under the caul : the authors of the dictionary of Trevaux, adopt the former of these opinions ; and the latter is found among the systems in our Mr. Chambers.

We have named these opinions, to tell the farmer they are erroneous. Experience, dissections, and certain observations, have shewn they are false : let him therefore take care that he is not misled by them, and that he place no dependance upon the methods of cure founded upon them. Internal medicines are useless. The horse may have a bad state of blood at that time, and this may render the cure difficult. In that case, the common sweetners of the blood may be given at the time he is under cure ; such as brimstone and antimony among his corn, but otherwise they are not wanted.



## C H A P. III.

*Of the real situation and cause of the glanders.*

**I**T is plain from observing the nature and progress of the disorder, that the cause of it does not lie either in the brain or the back-bone, the liver or the lungs, the spleen or the kidneys. The seat of the disorder is where it appears; no part of the creature is affected but the nostrils; and the disease really lies in the glands, which are situated in the thin skin that covers their inside. When the glanders are only in one of the nostrils, the gland or kernel, which lies near the jaw-bone on the same side, is to be swelled and inflamed, and not that on the other side; but as soon as both nostrils run, then both these kernels are found to be swelled in the same manner.

This disorder may naturally proceed from a cold, without the blood's being concerned in it; though it may happen, in other cases, that the blood is bad at the same time, and then the disease will be more difficult to cure.

When these kernels are inflamed, the running at the nose comes on, and this is the first and gentlest stage of the disorder. The horse's holding down his head increases this running; and thus a disorder is begun in a natural way, and continued by natural means, which is strengthening itself, while the farriers are attempting its cure by drenches; not one of which can have the least effect upon it, because they are levelled at an imaginary cause.

The lungs and spleen, the liver and kidneys, have been examined by dissection, in horses that have died with the disorder upon them, and they have been found all sound; therefore it is plain they have no share in the cause: it lies wholly in the parts where it appears. It may come from a simple cold in the horse; and it may also be occasioned by the matter of a disease falling upon that part; or may be rendered worse by a bad state of the blood. In these particular cases, the method of cure is to be the same with allowances for a bad state of the blood; as to the other case, it requires no particular consideration; for though a disorder of another kind may have been the cause of the glanders, by settling on that part, yet, when once settled there, it is the same as if the glanders had come in a natural way; and the same method will prove a remedy.

There is a thin skin which lines every part of the nostrils of a horse. In the nose there is a partition going all along the inside, which divides it into two parts, or the two nostrils. This partition is covered with the skin we have named: it is thin, soft and tender; and in it there are many small kernels.

*These*



These separate a soft moisture for rendering the skin supple and sensible; and this is all they are to do in their natural state; the abundance of their discharge being a trifling thing, and thrown off without offence: but these kernels will, by being disordered, separate a larger quantity of a fouler matter, and this is the glanders.

On each side of the partition which divides the two nostrils, there are large cavities. The same skin which covers the partition itself, is also continued to them, and forms a covering to their bottoms and sides; but in this part, the kernels are fewer and smaller than elsewhere, and they only separate a very small portion of the moisture for keeping the skin there soft. This is a happy provision of nature; because the lowest and innermost parts of these hollows are so deep and winding, that if any redundance of the matter had been separated there, it could not have been discharged as from the other parts; and nature would have been loaded and obstructed by the remaining of it upon the place.

The skull of a horse is composed of several parts; and in that piece which forms the forehead, just above the place of the eyes, there is a space between the two plates of the bone: these make what are called the frontal sinus's; but the farmer, without troubling himself with remembering such names, will understand that there are such hollows; and this will be enough for his purpose. These are covered throughout on the inside with the same skin, which covers the partition of the nostrils; and it has in this part the same sort of kernels. All this skin, and all the kernels in it, are the seat of the glanders. In the beginning, the kernels swell, and discharge a great deal too much matter; and these in the hollows of the forehead-bone most of all. They are therefore the main seat of the disease. When it becomes more violent, they are ulcerated or grow full of little sores; then they discharge a more offensive matter; and at length the whole skin of this part is enflamed, swelled, and eaten to pieces, and then comes the discharge of a bloody matter. This is no fanciful supposition, but is the exact and real fact found by examination.

When the head of a horse, violently affected with the glanders, is opened, not only the kernels are found to be swelled and sore, but all this skin is full of ulcers; and it is seen to be grown much thicker than naturally, and fuller of blood-vessels; and these are eaten to pieces at their ends. From these flows the blood, and from the ulcerated glands the matter, which come from the nostrils of the horse in this disorder.

We mentioned the natural hollows on each side of the par-  
tion



tion of the nostrils; and observed, that nature occasions so little of the liquor of the kernels to be separated here, that it serves only to moisten the skin, because if more were separated there, it could not be discharged: This mischief happens in the case of the glanders. The kernels there are disordered like the rest; they grow ulcerated, and they discharge a great deal of matter, which lodges in these hollows, and they are always found full of it in a very offensive condition, on the dissecting the heads of horses dead with this disease.

In the same manner, the kernels which are in that part of the skin, which lines the sides of the hollow in the forehead-bone, grow swelled, enlarged, enflamed, and ulcerated; and the skin itself becomes thick, raw, and bloody. All this joins to confirm the truth of that system, which places the seat of the glanders in this skin, or lining of the nostrils and its glands, and declares it not to be in the liver or elsewhere; because in all dissections of horses dead with the glanders, this skin and its kernels are found thus inflamed and ulcerated, and the entrails are found and good; unless when the creature has had some other malady beside.

These hollows of the forehead-bone in horses dead with the disorder, are found also full of thick offensive matter: and the change in the skin itself is greater here than in any other part. In a horse that has died without the glanders, this skin is thin, fine and soft, and there is never seen in it any blood vessel: but in a horse dead with the glanders, the skin is thick, hard, and inflamed; and there are blood vessels seen all over it, with their sides and ends eaten to pieces. In each nostril are two substances rolled up like horns, and in the same manner covered with the skin which covers the partition, and lines the cavities; and in these parts this skin is in the same manner enflamed, thickened, full of blood vessels, and ulcerated. Therefore as the skin we have described is the real seat of the glanders, it is universally affected, and no part of it escapes.

The disease first shews itself in those parts of this skin where the kernels are biggest, as in the hollows of the forehead-bone; so that they may be called in a particular manner the seat of the disorder: but it afterwards pursues its course through the whole extent of that membrane.

It is in general much the same structure we find upon dissection in the head of a horse, and in that of one of our own species: but there is a particular difference in those glands or kernels we have mentioned under the jaw bone, which one by one swell, as the disease affects first one, and then the other nostril. There are the same in men, and anatomists call them  
the



the sublingual glands : but in men they open into the hollow of the mouth ; so that whatever they discharge is managed as the spittle : but in horses they do not open into the mouth, but turn backwards, and pass behind the holes of the nostrils.

The mouth in mankind is in a great degree moistened by these glands ; and to supply that office in horses, as these have their opening turned another way, there are innumerable small kernels placed all over the insides of the lips. Now though the kernels we have just named are swelled in the first appearance of the glanders, yet the others within the lips are not at all affected : the disease not being concerned with the mouth, but only with the glands of the skin of the nostrils. It rarely spreads to any other part. In the extreme degrees of the disease, the partition of the nostrils which is covered by this skin, will be eaten by the sharpness of the humour ; but no dissection ever shewed any other bone to be affected.

If the liver, the lungs, or brain, were the seat of the disease, the creature must be pining in other respects ; and sooner or later would be carried off ; whereas we see on the contrary, that this disorder shews itself on horses otherwise in perfect good condition ; and that when it has rendered them unfit for better services, and they are delivered over to hackney coachmen, they live a long time with it, and shew no sign of any other distemper.

#### C H A P. IV.

##### *Of the causes of the glanders.*

**T**HE glanders may arise from a common cold, and in this case the first approaches of the disorder are to be guarded against, for they may be stopped, and that mischief easily prevented, which it will be afterwards very difficult to cure.

When a horse has a cold, and it falls upon his nostrils, it will be seen by his snorting and frequently tossing about his head, and afterwards by the nostrils being more than ordinarily wet. If the horse be in a feverish disposition at the same time, the skin and its kernels will enflame as well as swell, and all the symptoms may very naturally follow.

If it seize upon the nose, let the horse be blooded largely : then give him twice in the day a good warm mash, and ride him gently afterwards. Keep him warm and clean, and the next day give him the common purge.

If this do not answer let him be blooded the day after, as largely as at first, and pursue the same course one day more. This rarely fails.

I have practised this myself with the greatest success : I have  
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all the reason in the world to believe I have prevented the glanders in many a horse; and can say with the greatest truth that I never had one, since I have followed this practice, that has fallen to that disorder, which I reasonably attribute to taking this care in time.

A cold seizing upon the nose is not the only thing that may cause the glanders. A surfeit may take the same effect. This fouls the blood, and produces gross humours in abundance; and these may naturally be discharged by the kernels in this skin: this may swell, inflame, and ulcerate the skin of the nostrils, and be an immediate cause of the glanders; and in this way that disease will probably be more dangerous and more difficult of remedy. The method of cure must be the same, only with this caution, that sweeteners of the blood must be given at the same time.

Before the farmer attempts to cure a horse, he must be assured the disorder is what he takes it to be: if he observe carefully the symptoms we have set down, he cannot be deceived; but he must not suppose every running at a horse's nose to be the glanders; for in that mistake he may sometimes set about a troublesome and harsh method of cure, for a disorder that would perhaps have gone off of itself, or with a single bleeding: or he may, in some cases, attempt to remedy that which is incurable; and disgrace the method, because it would not cure a different disease.

He is to observe the difference between a cold settling upon the nostrils, and the glanders. We have shewn this may bring on the glanders, but it is not that disease itself, and slighter methods will cure it. An abscess in the lungs may discharge itself at the nostrils of a horse, and this, though it on a slight observation resemble the glanders, yet is altogether distinct in its nature, origin, and situation; and therefore cannot be reached by the proper cure of that other disease.

Let the farmer observe the nature and colour of the matter. If this be sharp, corroding, and ill-coloured, it looks like the glanders, therefore let him look into the inside as far as he can; and if he perceive the skin swelled, inflamed, and full of little sores, there is little room to doubt of its being this disorder. Let him next observe whether it runs continually, which if it does is another proof; and lastly, let him examine the horse in other respects, and if he find him in every other circumstance well and healthy, he may conclude with certainty this is the disease. If the matter be thick and white, and the inner part of the nose not inflamed or ulcerated; and if it run very little while he is at rest in the stable, and encreases  
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on his being put to work ; and finally, if he has a difficulty of breathing, and a rattling in his breast as he takes his breath, all these symptoms considered together, will shew that the disease is not the glanders ; but an abscess in the lungs.

C H A P. V.

*Of the method of cure for the glanders.*

**T**H E glanders is a collection of ulcers in the skin of the inside of the nose, and its glands : knowing this we may advance rationally to the cure. The method must be by cleansing and freeing the parts from the lodgment of this sharp matter, and healing of these ulcers. That might be done in the same manner as external sores are cleansed and healed, but the difficulty is to come at these : for there is no way of getting freely and properly at the complaint : therefore the first thing is to make an opening to the place where nature has not given any. We know the principal seat of the disease is within the cavity of the forehead bone, and we are to proceed accordingly.

When the skull is beat in by a fall in our own species, the surgeon cuts a hole through it in another place, that he may have way to come at the depressed part within. This operation is very terrible, but very safe : it is practised continually, and with success. What we are ourselves able to endure, certainly this coarser creature may. On this has been founded the only rational method ever laid down for the cure of the glanders.

A hole is to be pierced through the skull of a horse, in such a place as is least liable to inconvenience, and most properly situated for the throwing in proper liquors to the seat of the disorder. The first consideration is, whether the glanders be seated only in one nostril, or whether it have seized on both : if only one be affected, then one such opening through the skull will be enough : if both be infected, two such openings are to be made, one for each.

The place for this opening is, on one side or both sides the head. It may be done without the least inconvenience or hurt to the creature, and it will give a free passage to the necessary applications. The best place is at some distance below the eye. In performing this on the human species, if any bad consequences ever attend it, they are not owing to the cutting a hole through the bone, but to the injudicious hand of the operator hurting the brain in doing it. Now in horses the brain does not come so low as to the eyes ; and therefore in making two holes, or more if necessary lower down, there is not the least danger.

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The safety of this operation being thus shewn, the use of it is evident. The proper liquors for washing and cleaning of the parts, are to be thrown in at these openings by a syringe; and the holes are to be so made that the syringe being pointed upwards, the hollow in the forehead bone, which we have shewn to be the great seat of the disease, may be thoroughly washed by it. It were very much to be wished, that the opening could be made just where this hollow of the forehead bone is; but that lies so high that a farrier might do mischief. The brain is situated there, for the part is considerably above the eyes, and more toward the middle of the head, but it will answer every good purpose of this method if the opening be made lower, and the liquor thrown up into it. In this method one hole may be made to answer the purpose in most cases, though there will not be the least disadvantage in making two or more for better convenience.

Though the cavity or hollow in the forehead bone lies highest; yet the hollows at the sides of the partition of the nostrils are the most difficult to be well cleaned. Upon two principles alone turns the whole method of cure in this case; the first is, that there be a way by which the liquor intended for washing and cleansing the parts can be conveyed to them through a syringe; and the other, that when the matter is thus washed off from the skin and its kerneis, there be a passage for the liquor and that foul matter to go off freely together.

In respect of the matter lodged in the hollow of the forehead bone, that being washed away by the liquor from the syringe will freely and naturally discharge itself, together with the liquor, out at the nostrils; but it is not so in the natural state of things, with respect to the matter which fouls the inside of the hollows situated at the sides of the partitions of the nose; for we have shewn already that they are so deep and crooked, that there is no way of getting any thing once lodged there, out of their bottoms, by the natural passages.

This incurs the necessity of another opening in the bone, but as this must be much lower than the other, there can be no possible danger in making it. All below the eyes in a horse's head should be considered as the bone of the nose, not the skull; we understand by skull the covering of the brain, and there is no brain within or near that part. An opening in this place is altogether necessary, and not at all dangerous. It would be in vain to wash off the matter in these cavities ever so clean, if, when that were done, a part of it must of necessity be left in the cavity, together with some of the liquor of the syringe; but this is easily to be discharged in this manner. The best place



place for making the opening to wash and clean these cavities, is to pierce through the bony divisions; and then to open another hole somewhat lower, to give passage for all that is washed out.

The best direction for the exact place of these holes is, that the farmer and the farrier together examine the skull of a dead horse. They will see how these several cavities are placed, and by that know better than by any formal directions of words or figures, where to make them. When the holes are opened, and the syringe is used, the proper method is to throw in the liquor briskly, and then to stop the nostril, that it may be forced out at this hole: by this means all will be perfectly cleared; and by a repetition of this cleansing, and an injection of proper liquors, the disease will be thoroughly cured. This reduces the glanders to the condition of an outward malady, and it is thus to be remedied in the same manner.

In case of the matter, together with the injection, not coming freely and perfectly out at the lower opening, nothing more is needful than to make way for it by thrusting in the point of any sharp iron instrument. It frequently happens that the bones have a particular construction in this part; but when they have it is attended with no farther difficulty. This conformation may stop in the matter, or a part of it, but the opening thus made never fails to discharge it. If the opening made by the point of the instrument, should close up before the time, it may be kept open by burning it with a red hot iron.

This method of cure was proposed in France, and there was very well received; there is no question of its success wherever it shall be introduced. We have shewn the whole design and nature of the operation, and shall in the next chapter treat of the best methods of preparing the liquors for injecting.

#### CHAP. VI.

*Of the liquors to be injected for a cure of the glanders.*

**P**ROPER liquors for performing the cure are of three kinds; the first cleansing alone, the second cleansing and healing, and the third styptick.

For the first liquor, set on three gallons of water to boil, and have ready three pounds of fine stone lime new made. When the water boils pour it into a pan, large enough to hold three times the quantity, and by degrees put in the lime. There will be a great swelling and boiling up, and when all is over, and the whole is thoroughly cold, the water will swim clear and transparent at the top, and the lime will be settled in a white powder



powder at the bottom. Pour off the liquor, and set it by all night: in the morning there will be a skin upon it; scum this off and bottle up the clear water. This is lime water of an exact degree of strength for the intended purpose. Let the farmer be sure not to buy it, but to make it himself. To a quart of this lime water put a quarter of a pint of vinegar, and half an ounce of basket salt, let it all melt together, and then it will be fit for use.

Two openings being made in the head of the horse, let a pewter syringe be got, that will hold half a pint. Set on the liquor just named, to warm; and when it is of such heat that the hand can be bore in it ever so long without pain, it is fit for use. Hold the nostrils of the horse together, and drive in this liquor carefully and forcibly. It will run out partly at the lower hole, and partly at the nostrils, when they are let open; as they should be at a proper time, when the greatest part of the liquor has gone the other way. When this syringefull has been used, heat as much more, and throw it up in the like way. Then let the horse rest twelve hours, after which repeat the same method. Morning and night are the best times of doing it; and this is to be continued four days, but with the use of the second liquor in the middle, and at the end of that time.

The second liquor is thus prepared. Set a fire shovel over a very gentle fire, and put into it a quarter of an ounce of green copperas beat to powder: stir it about till it becomes a dry grey dust. Put this into two quarts of molasses spirit; and add a little scrapings of oak galls. Shake this up and set it by all night. In the morning it will be black like ink, and this is a cheap and easy way of preparing the famous styptick of Helvetius.

Upon the second day use the water with the syringe, at four o'clock in the afternoon, instead of late in the evening; and, towards night, warm half a pint of this black tincture. Throw this up with the syringe in the same manner as the other; and leave the horse to his rest. The same do on the evening of the fourth day, and then prepare the third liquor.

Powder a quarter of a pound of allum, and add to it the same quantity of white vitriol. Put them into a strong earthen pipkin, without any water, and set them over the fire; they will melt and afterwards dry again. Then take them off, grind the whole to powder, and put it into a large jar: pour upon it a gallon of the lime-water, stir them well with a stick, and leave it all night. In the morning pour off the clear liquor, leaving  
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the settlement behind ; add to it a quart of strong vinegar, and bottle it for use.

This is to be the liquor for injecting, after the four first days. Every morning and evening warm a pint of this, and carefully throw it up by the syringe, observing to stop the nostrils at first, that the greatest part of the liquor may each time run out thro' the lower hole in the face : then let some of it come last of all through the nostrils ; by this means, every part will be washed and cleansed twice a day by this excellent liquor ; and, by degrees, the whole will heal. Every other day, the last injection of the water must be performed in the afternoon, as directed in the preceding article ; and at night each of those days, the black tincture is to be injected.

This is a plain, rational, and safe method of proceeding ; and by this means the glanders will be perfectly cured, at a very small expence, and with no great trouble. Many serviceable horses will be preserved from the dogs, or from the meanest employments, and rendered as valuable as if the disease had never attacked them.

The time required to perfect a cure, will be different, according to the degree of the disorder ; but, in general, it may be called three weeks or a month ; the progress of the cure will be seen by the stopping of the running ; and it will always be adviseable to continue the injections a fortnight after the cure seems perfect, every other or every third day. If the flesh grow fast about the openings, it must be kept down by a hot iron ; for there must be preserved all the time a free passage for the liquor both in and out ; and if the horse be otherwise disordered, brimstone and antimony are to be mixed and sprinkled over his provender.

## CHAP. VII.

### *Of purging a horse.*

THERE are many occasions on which a horse may want purging, and many sorts of physic answer the purpose ; but before we come to the method of preparing these, it will be necessary to give the farmer proper directions concerning the use of them. A horse must be prepared for a purge the day before it is given, or it will take very little effect ; and then it will operate more or less, according to the management of him during the time.

The day before a horse is to be purged, give him a good quantity of water with scalded bran in it, warm. Keep him quiet, and the next morning, before he has any thing to



eat, give him the purge. Either of the following will answer the common purposes, with little charge.

1. *A purge with aloes.*

Take an ounce and a quarter of horse-aloes beaten to powder, and a quarter of an ounce of cream of tartar, mix these up with an ounce and a half of fresh butter, and half an ounce of powder of anniseeds, work this up into a consistence, and roll it round into two balls. Rub these over with butter, and give them to the horse; they will slip down freely; and after them give him a horn of small beer made warm. The dose is to be made larger or smaller, as the horse is larger and coarser fed, or finer, and managed more delicately. There is as much difference between the constitution of a cart-horse and a racer, as between a drayman and a person of quality; and they must in all respects be treated accordingly, not only in the strength of the dose, but in the management afterwards: for what suits one will be quite improper for the other.

2. *A purge with jalap.*

Take powder of aloes an ounce, powder of jalap a quarter of an ounce, and powdered ginger a dram: mix these up with two ounces of fresh butter, and make the whole into a couple of balls: grease them on the outside, and give them to the horse with some warm ale afterwards. These are two common receipts, but they are often ill proportioned in the quantities; something of this kind stands under the name of a purge for horses in most books that treat of these things; but the quantity of the anniseeds is too great, in the common directions for the first; and this will make a horse sick afterwards; and to the other there are commonly added useless ingredients. These are approved proportions, and they will answer almost every occasion there can be for a horse's being physicked in this way.

C H A P. VIII.

*Of managing a horse with his physick.*

**I**F the balls and the beer be given early in the morning, and let the horse be rid out gently for a quarter of an hour. Then bring him cool in, and let him be set up two hours without food. After this give him a small quantity of good hay, and a quarter of an hour after some warm water. An hour after this give him some scalded bran. He will purge kindly, and after this he should be rid out a little again; then when he is brought in, he should have some bran and water warm, with but a small quantity of the water. Then let him be rid out again. It will be easy to make it work more or less, by giving him



him more or less exercise, and more or less of the bran and water.

If the purge have been too violent, and will not stop, the following astringent drink will stop it.

*An astringent drink.*

Boil three pints of stale beer, and some pieces of crust of brown bread : to this put an ounce of whiting, and a quarter of an ounce of diascordium, made without honey : if this does not stop it, in four or five hours, give the same quantity of whiting, and double the quantity of diascordium, in only one pint of the beer and bread. This will make him altogether quiet and easy ; and he will be in his body as usual.

# CHAP. IX.

*The care of a horse in taking him up from grass.*

**I**T is generally proper to purge a horse when taken up from grass ; but this must not be done immediately on taking up ; he ought to be kept in the stable a week , and he should have scalded bran twice before the purge. There must be a great deal of care taken of a horse, in general, in the taking him up from grass, otherwise he will fall into disorders very difficult to cure. He must be dry when taken from the pasture, otherwise he will very likely grow scabby.

Bartholomew-tide is the latest he should be left out, if of a tender make ; for after this time he will have more cold and less nourishment. Dews are nipping after this season, and the grass has lost its strength ; so that partly for want of nourishment, and partly for the chilling of his blood, it is much if he escape some disorder.

It is a good method with a delicate horse, to trim him as soon as he is taken from grass. He is to be led out in a fine warm day, and when he is trim'd, some soap and a good quantity of warm water is to be got ready. He is to be rubbed over with the soap, taking care it does not get into his eyes or ears, and then washed with the warm water and some flannel-cloths : this is to be done twice over, and he is then to be led into the stable, and gently rubbed with a cloth till dry. He is then to be kept a week or more in the stable, and then purged and blooded. This course naturally and perfectly reconciles him to the new method of living, and he falls into no disorder.



## C H A P. X.

*For a cold.*

**T**HIS is a disorder so well understood, that it cannot be mistaken, nor does it need any explanation. Boil in a quart of ale three ounces of fresh liquorice root, beat very fine into threads. Strain the liquor off, pressing it hard, and add to it three drams of elecampane powder, one dram of powder of anniseeds, a quarter of a pint of oil, and a quarter of a pound of honey; mix all, and give it warm. If it does not take effect the first time, let it be repeated three or four times.

*Balls for a cold of long standing.*

Put into a large bowl six pounds of wheat meal, mix with it two ounces of powder of anniseeds, cummin seed one ounce, linseed three ounces, fenugreek-seed one ounce and a half; stir these well about, then mix half a pound of liquorice powder, and a quarter of a pound of flour of brimstone, add these to the rest. Lastly, add bay-berries and juniper-berries, powdered, three ounces of each, and the same quantity of powder of elecampane. When all are well stirred and mixed together, break six eggs, throw away the whites, beat up the yolks with two quarts of mountain wine. Add to this a pound and a half of honey and a pint of fallad oil. Mix all these perfectly well together; then bring in the powder, and work the whole to a paste. If this should be too stiff, a little more wine must be added; and, if too soft, some flour must be put in, till the whole is of such a consistence that it will conveniently roll into balls.

These are to be made of the bigness of a hen's egg, but round. This rolling them up is only for the convenience of keeping; when they are to be used they are to be dissolved. Two is the proper quantity for a dose, and they are to be melted in water, and given morning and evening, for fifteen days.

## C H A P. XI.

*For the sleeping evil.*

**T**HE sleeping evil in horses is what we call the lethargy in our own species, and it will be as fatal to them as it is to ourselves, if not remedied in time. The cause is their eating a great quantity of coarse food, and having less work than usual. It shews itself by their being sluggish, and continually dozing: the remedy is the following ball.

Pound in a marble mortar a handful of the plant called wall-pepper, or sharp stone-crop; it is a common creeping plant upon walls, and bears yellow flowers. Put to this a very little white



white wine, and squeeze out the juice. Grind in a mortar four ounces of elecampane powder, and one dram of powder of pellitory of Spain; add the juice to these, and then put in a quarter of a pound of Castile soap, work and beat all well together. Then put in liquorice powder by a little at a time, enough to bring it to a soft paste. Keep this in a pot, and every morning before the horse has taken any food, give him a piece of it as big as a large walnut, greased. Let him drink milk and water, warmed, after it, and keep him stirring. This is a receipt I have seen try'd many times, and never once found it fail to make a perfect cure.

C H A P. XII.

*For the gargle.*

**T**HIS is a disorder that principally affects the head and throat of the horse, and, if not taken in time, is very dangerous. It is also unfortunate in another respect, for it is contagious; and, from one horse will spread itself through a whole stable. It is most dangerous in autumn, and generally attends dry seasons, when there being a scarcity of water, the horses are forced to drink what is foul and bad.

I have also known it plainly caused by horses feeding upon a poor bad grass in wet places; where there generally lies water over the ground; but it happens to be dry at these seasons. Some horses are fond of this filthy food: I have observed their chops all dirtied with eating it down to the stumps; and generally the gargle has followed.

A horse that has the gargle hangs down his head, and is restless: he breathes with difficulty: his eyes are gummy, and his head swells; he rattles in the throat, and he goes weakly and staggering. As soon as the farmer sees this disorder, let him separate the creature from the rest; and bleed them all by way of prevention. Then bleeding the sick horse more largely than the others, give him the following drench.

Set on two quarts of ale to boil, and as it heats stir in a dram of saffron cut small, and half an ounce of Philonium Romanum. Bruise two heads of garlick and two good handfuls of wormwood, press out the juice, and pour this to the rest; let it boil a little, and then set it off. This is for two doses; if the horse be very bad, he may have one in the morning, and another at night; if not, one at night only will do, keeping him three hours without food before, and giving him nothing after it.

Let this be repeated every day, or every other day, according to the degree of the disorder, for four times, and let him all the while be kept warm, and give him boiled oats and ground malt in a mash.



## C H A P. XIII.

*For roughness of the coat and swelling of the heels.*

**W**HEN a horse grows rough in a stable, and his heels swell, the following mixture is to be given him with all his food. Take a pound of flour of brimstone, half a pound of turmeric, and a quarter of a pound of crude antimony in powder. Sift these together; by which means they will be thoroughly mixed, and strew a little of it among all his victuals.

## C H A P. XIV.

*For a ravenous appetite.*

**T**HERE is a disorder in our own species called a canine appetite, in which the person is greedy, and devours every thing, with no advantage to the body. Horses are subject to the same, and they will consume more than their due quantity of food, and still be poor and lean. They swallow their meat without chewing it. It is much more common than it is thought; and we advise all who are concerned with horses to regard it. They may know it by watching the horse's manner of eating, and by observing his stools. If he snatches at every thing, and eats greedily and quick, it is a suspicious circumstance: and if his food be seen entire and unaltered in his dung, it is a proof. When horses have this ravenous appetite to a great degree, their provender will go through them unaltered, and they will grow poor and weak till they are useless. In this case give the following drench.

Mix a gallon of milk and a quart of oil: stir in as much raw wheat flour as will mix in without making it too thick for swallowing easily. Give him a good drench of this every morning, and about half an hour after offer him some hay. Give him but a moderate quantity, and then let him be quiet. When he has been rode out a little, or worked for some hours, give him some more hay. He will snatch at it and be ravenous as usual; but let him have only a little at a time, and let him see no more. Feed him to the fill by a little at a time, till he will not eat any more; then set a good quantity before him, but don't let it remain a great while in his sight. Repeat this every day for a week, and he will eat like other horses.

## C H A P. XV.

*For the staggers.*

**T**HIS has been fatal to many a stout creature. The principal cause is the carelessness of servants, in turning a horse out to grass, while he is hot from labour. This gives him a violent



violent cold, which loads his head with a tough phlegm.

A horse is known to have the staggers by his tottering, staggering, and going weakly and faintly. His eyes will be watery, and at first he will thrust his head into the litter, and by tossing it up and down shew his great uneasiness: in the more violent state of the disease he will beat his head against the wall in his agony.

This disease should be watched in the beginning; for it is then much easier cured than afterwards. The first thing is to bleed him largely. If the disorder be perceived in time, a good bleeding alone is often a cure. Some advise bleeding in the flank, but it is of no consequence from what part, except in the head itself; which, if the first bleeding do not succeed, may be very well done during the use of the other remedies.

A natural bleeding at the nose often carries off disorders of the head in ourselves almost immediately. The sailors have a way of bleeding themselves in violent head-achs between the gristles at the end of the nose: and Dr. Dover tried to bring in the custom of bleeding in the same part more artfully. I have known it done sometimes, and always with success; but neither the surgeons nor the patients liked it, so it presently dropped. The good accruing from this bleeding, though in never so small a quantity, shews what may be done for a horse in this terrible disorder the same way. The country farriers method is a very coarse one, but I have seen great good arise from it.

They sharpen a tough small oak stick, and split it at the end like a fork. They thrust this up the horses nostrils, and set them to bleeding; and this is very successful. It may be done after two days, if the following medicines do not take effect.

Two hours after the common bleeding give the following glyster. Heat two quarts of emetick wine, and dissolve in it a quarter of a pound of Unguentum Populneum: throw up this as a glyster, and let him rest. Mean time prepare the following medicine: boil together two ounces of powder of the scoria of liver of antimony and five pints of strong beer. When it has boiled five minutes take it off the fire: dissolve in it a quarter of a pound of butter. An hour after the first glyster has come away give this in the same manner, and then walk him gently out in a warm dry place. Rub his legs well with wet whisps of straw, and feed him with bran and bread, and warm water.

Two hours after the second glyster has come away, dissolve an ounce of venice treacle in a pint of white wine, and give it to him as a drench: and presently after give another glyster thus made.

Boil a double handful of mallows, roots and all in two quarts



of spring water to a quart; add to this when strained off two ounces of sal polycrestum, the same quantity of venice treacle, and three quarters of a pint of oil: give this warm, and set him up for rest.

The next day let one or other of these glysters be repeated as occasion may require; and put into his ears some pounded rue, black hellebore root and pepper mixed up with brandy. Sow up his ears to keep this in, and let it remain there all day. Then give the following drink. Boil in two quarts of ale two ounces of turmeric, and the same quantity of anniseeds in powder; add to the strained liquor a quarter of a pint of brandy, and give it for a drench.

The disorder is a very severe one; so that it commonly soon terminates either in the death or recovery from the immediate danger; but sometimes, though he get soon out of danger, he recovers slowly. In this case the glyster need not be repeated, but he should continue in a course of the drench for some time, and be kept carefully warm and well rubbed.

There is another famous remedy which often assists greatly; and sometimes succeeds by itself: it is this: dig up a dock root and quarter it; cut a slip of the thickness of half a finger, and an inch long: then spread a plaister of common pitch of half the breadth of the palm of the hand: these being in readiness, cut a slit through the skin to the bone in the middle of the horse's forehead: lay in the piece of dock-root, and cover it with the plaister.

If it runs in twelve hours, the horse will be likely to recover; if not, the case is desperate.

#### C H A P. XVI.

##### *For the farcy.*

**T**HE farcy is the most loathsome disease that can be conceived: it is a creeping ulcer, that spreads and runs in an offensive manner; and is not easily remedied, when got to any height.

The first appearance of it is in hard knobs and lumps; and these spread till they over-run the greatest part of the body. It is owing to a disordered state of the blood from bad food and unreasonable fatigues; and when a horse is in a condition to receive the disease, it will be caught by standing near one that has it; or the spurring with a rusty spur; the wounding the mouth with the bridle, the galling with the belt, or any other hurt will bring it on.

Often a horse will itch so in some part with the foulness of his blood, that he will rub till he breaks the skin, and the disorder shall



shall begin that way, and spread quickly. The fattening up a horse hastily, and taking him from a laborious life to a quiet stable will sometimes bring it on. I have seen this error frequently: a farmer designing to part with a horse, has taken him up to fatten in a hurry; and instead of answering his purpose, has given him this disorder. It is to be cured easily when taken in time; but the generality of the country people don't perceive the disease till it is at the height. I saw a neighbour James Barnes's horse in 1738 cured perfectly, when it was taken in time, in about a fortnight; and it was done thus. First the horse was blooded largely in the neck; then the whole body was carefully looked over, and several of the knobs were found in different parts, beside two or three that were burst.

A liquor was thus made to rub them. Take half a pound of wood-foot, and the same quantity of soap-lees, boil them up together; put in two ounces of allum, and an ounce of verdigrease, and a little water, and stir all well together; then put in a dram of powder of euphorbium, and four ounces of powder of white hellebore root: let the whole boil up together, and then pour it into a jar. With this the horse was rubbed in all the places where the disease appeared: and at the same time a good deal of flour of brimstone was given him in his food. The cure was perfected, and the disease never returned.

Another method is to anoint the places with ratsbane mixed up with butter; and at the same time to give the following drench. Take a handful of the inner bark of the elder, the same quantity of the inner bark of the walnut tree, and the same of berberry bark; cut these small, and put them into two quarts of strong beer: let them boil a considerable time. Near the end of the boiling throw in a handful of wall pepper shred fine. When it has boiled up once or twice with this, strain off the liquor. Put to the strained liquor a quarter of an ounce of grains of paradise, and an ounce of powder of turmerick, and give it for one dose. This must be repeated every day as long as the outward remedy is used; and give moderate exercise and moderate food.

When the disease is in its worst state, the sores will not give way to any of these applications. They must be burnt with a hot iron, and then the same course followed that has been directed already: for the same remedies that would take no effect before, will answer the purpose after the effect of the hot iron.



## C H A P. XVII.

*Of the malanders.*

**T**HIS is another external disorder of a horse very painful and troublesome, and very difficult of cure; some say nothing more is to be attempted than to alleviate the pain; and that it is dangerous to stop the distemper.

This is an error; for there is no degree of the malanders but may be cured with safety. This disease shews itself on the fore legs, upon the inner part just against the bending of the knee. It is not a knob or ulcer like the farcy, but a hard, dry, flat scab, of which sometimes there is only one great one, sometimes several smaller: these are cracked and chopped, and have stiff hairs growing upon them.

This is the whole of the disorder: it sometimes is very violent and inveterate, sometimes more slight. When it is very bad it makes the horse halt; and when least it occasions him to go stiff till warmed with exercise.

The general cause is bad management. It is the common disorder of horses kept in a slovenly manner, and much more rarely affects those which are managed carefully. Those horses are most subject to it which have a great deal of hair upon their legs; and they are the most difficult to cure.

Sometimes the malander is only a foreness in the part, while the horse is otherwise in health; sometimes the blood is bad, and in this case the disorder is more violent and more difficult to be cured. When the malander is only the effect of carelessness, and 'tis upon a horse otherwise healthful, the method is this.

Let him be kept to his usual work and food: set on a saucepan with three quarts of water, put to it half a pound of fenugreek seed bruised, and a pound of fresh marsh mallow root cut in slices. Boil this till it is like a jelly, strain it off hot, and press it hard out, then add to the thick liquor half a pound of opodeldock ointment. Make some of this hot morning and night, and dipping flannels in it, wrap them round the leg where the complaint is, as hot as the hand can bear to touch them. Let this be several times repeated; and, at the last of all, wet some of the ingredients, which must be saved when the liquor has been pressed out, with the liquor hot, and lay them upon one flannel, cover them with another, and wrap the whole round each leg, tying it so as to keep it on, but not tight. Let this be done every day twice, till the hard substances begin to soften; after this once in four and twenty hours will do; and there will thus be a perfect cure.

Before the first dressing let the hair be clipped round about  
the



the place, and the whole part about the malanders washed clean with warm soap suds. Let this be repeated at times during the cure; and after it is perfected, let the legs be kept very clean in this part, for fear of its returning. In this manner a horse will be cured very easily, that has no taint in his blood: but if there be, care must be taken, by giving inward medicines at the same time.

When this is the case the owner will perceive it by his habit of body; and by the outward remedy not taking its desired and natural effect, he is then to proceed thus.

Let a pound of crude antimony in powder be mixed with four pounds of flour of brimstone; and let some of this be sprinkled among all his food. This is better in such a case, than giving it in balls or drenches, for he takes it with his nourishment a little at a time, and often; and accompanying the food in its passage through the intestines, its virtue goes into the blood, together with the nutritive part of the food.

I have heard many who should know something better than the vulgar, say, that they would not cure a horse of the malanders if they could, for that all that is prudent is to keep him from growing lame with them. They have an old proverb, that curing the malanders is shutting up the wolf in the sheep cot. But they may be sure there will be no danger or damage in curing any outward disorder, when the blood is at the same time rectified within.

#### C H A P. XVIII.

*For over-weariness.*

**W**HEN a horse has been inconsiderately rode or worked; and no right care taken to recruit nature by food or rest, he will be poor, dispirited, and ill looking; and in wrong hands may be utterly lost. He will not eat, or not enough; or his food will do him little service. Recourse must be had to medicines, before he will have any real benefit from his provender. Mix in half a pint of white wine half an ounce of venice treacle, and half a dram of powder of saffron; give him this every night for four times. It will warm and strengthen nature in every part; he will recruit in strength and spirit during the night, and rising in the morning from a good rest, he will eat freely and heartily. He must have choice food, clean water, and gentle exercise, and less than a week will recover him.

#### C H A P. XIX.

*For inward heat.*

**I**T may always be perceived that a horse is out of order by his uneasiness. If he be restless and faint, and, upon putting a hand



hand in his mouth, his breath is found hot, and his palate and tongue inflamed, give him the following. Mix together a pint of new milk, two ounces of honey, three ounces of sweet oil, and half a scruple of salt prunella. Give him this every morning, and keep him an hour after without food, repeat it till he is recovered. Three doses usually perfect the cure, if not he may take more.

## C H A P. XX.

*For a scurfy skin.*

**A**LL creatures are liable to foulness of the skin, when they are not taken good care of: this is sometimes attended with other disorders, sometimes not. When there is no other complaint joined with it, the remedies are to be only external.

Make some very strong soap suds, and put in some vinegar, and powder of white hellebore. First clean the horse well dry; then rub him all over with a brush, wet with the soap suds, and then wash him all over with the same, by throwing some over him, working it in with the hands and rubbing him with a coarse cloath. After this let him be taken in and dried thoroughly, and give him some good food and clean litter.

Mix up a pound of flour of brimstone, a quarter of a pint of oil of turpentine, and as much hog's lard as will make the whole into an ointment. Rub him well with this an hour after he is thoroughly dry from the washing. The next day boil a quarter of a pound of white hellebore, and a pound of dock root, in a gallon and half of water. Make this into suds, by beating it up with a good quantity of soap, and wash him with it. Then anoint him well with the same ointment as before. Repeat this every day for seven, eight, or nine days, according to the nature of the complaint, and he will be cured: last of all wash him well with the suds, without anointing him after it.

When the complaint has proceeded from bad food, bad water, and ill management, as well as uncleanness, the same outward method is to be used; and he is to have flour of brimstone and powder of antimony inwardly in his food.

## C H A P. XXI.

*For sore heels.*

**S**ET on an earthen pipkin, with a quart of fresh urine. Put to this an ounce of roman vitriol, and four ounces of green copperas, let these melt, and then put in the gall of an ox, and a quarter of an ounce of oil of vitriol. Rub the sore part gently with this every morning and night till it is well. When well wash it very clean with soap suds, and keep it clean from time to time for fear of a return.

If



If there be a great running from the part after the first two days, put in a quarter of a pound of allum to the liquor.

C H A P. XXII.

*For a cold caught at grass.*

**T**HIS is not dangerous in itself, but ill management may bring it to be fixed, and to have the worst consequences. Timely care soon remedies it; and the proper course is this. Set on a pipkin with a pint of ale, and half an ounce of spanish liquorice. Stir it about, and when the liquorice is dissolved take the horse up, and give it to him early in the morning: ride him half an hour softly after this; and then turn him out. Repeat this every day till he is cured, which is generally in a week.

C H A P. XXIII.

*For the cholick.*

**H**ORSES which are kept with great care are less subject to the cholick than others; but none are exempt from it entirely: it is a common complaint in the farmer's stable; and when not properly managed will be attended with bad consequences. The most usual cause of this disorder is coarse green food: let the farmer therefore when he perceives this disease coming on, change the food of the horse; and give him some warm bran and water, with a few drops of oil of juniper.

Often this proves a perfect remedy; but when it does not, give him the following glyster. Boil two handfuls of mallow leaves, stalks, and roots together in three quarts of water, to two quarts, then strain it off. Set on the clear liquor again, with a quarter of a pound of caraway seeds; and a quarter of a pound of brown sugar, let it boil up two or three times, then strain it off, and add to it a quarter of a pint of sweet oil, and a spoonful of oil of turpentine. Let this be given as a glyster, and walk him after it. Two hours after this is come away give him three drams of philonium romanum, dissolved in a pint of warm water, as a drench.

If it does not answer by the next morning repeat the dose. Keep him from bad food, and give him warm water with some bran to drink, and he will perfectly recover.

C H A P. XXIV.

*For the convulsions in the bowels.*

**T**HIS is a name by which farriers express a degree of the cholic much worse than the preceding, and often very dangerous. The farmer will know it by these signs. The horse stretches out his legs, neck, and his belly; he rubs himself against



against the walls ; stamps upon the ground violently with his feet ; and lies down and gets up again many times together. His belly looks swelled ; and in the beginning of the disorder his mouth is very hot : afterwards it is cold ; and then he is in great danger.

Bleed him moderately ; then give him the glyster last directed, only adding to it a quarter of a pint of gin. Dissolve one dram of philonium romanum in half a pint of mountain wine : add to this a quarter of a pint of sweet oil, and two tea spoonfuls of spirit of hartshorn, give him this as a drench ; and ride him or walk him softly after it.

If this does not answer in three hours, grate a couple of nutmegs, put them into a quarter of a pint of gin : add a quarter of a pint of sweet oil, and one dram of powder of saffron. Give him this and walk him softly. If there be no amendment repeat the glyster. Then give him these two drenches alternately once in four hours, till he is well.

#### C H A P. XXV.

*For cracks about the feet.*

**W**HEN this disorder is taken in the beginning, it may be cured by the method we have directed for sore heels ; but when it comes to an inveterate height, and the cracks are deep, and their edges hard, it is to be treated in a different manner. Boil a good quantity of marshmallow roots and bran in some water, and straining this off beat it up to a thick lather with soap. Let the heels all about the cracks be thoroughly soaked and washed with this : and then dry them.

Set on an earthen pipkin with a quarter of a pound of hog's lard, and the same quantity of venice turpentine. When they are melted throw in half an ounce of bees-wax sliced thin, and when that is melted dust in half an ounce of powdered verdigrease. Stir it all very well together ; and when it is mixed take it from the fire, and stir it now and then till it is cold. When the heels are dry from the washing, anoint them thoroughly and carefully with this, both on the edges and within : then spread some of it upon leather, and wrap round the heels. Let this be kept on by tying ; and not removed till the next morning : then let the whole dressing be repeated as at first, washing, anointing, and covering them up. Let this be repeated every day, and there will be a speedy amendment, and in some time a lasting cure.

#### C H A P. XXVI.

*For swelled heels.*

**T**HIS is an accident to which horses are liable that are kept in stables, when they have no other complaint. Bleeding



is serviceable, and it is no way so well performed as by leeches upon the part. In a morning let the horse be led into a pond that is shallow, and has a good many of them in it. Let him be kept standing there some little time, and they will fasten on him of themselves. There let them take their chance: they will presently make a good bleeding, and the horse will soon recover.

C H A P. XXVII.

*For a strain.*

**D**ISSOLVE two ounces of castile soap in as much spirit of wine as will melt it: the soap must be cut into thin slices, and put into a jar with the spirit of wine, and set in a warm place. When this is dissolved put in half an ounce of camphire; that will melt presently, and then the whole will be fit for use: it is a kind of opodeldock, and will answer all its purposes. Let the strained part be rubbed with it very well with a warm hand every night and morning, till the cure is compleated.

C H A P. XXVIII.

*For running eyes.*

**T**HIS may always be cured by the timely use of the following water. Take four handfuls of ground-ivy, cut it small, and then beat it in a marble mortar. Boil six eggs hard, chop the whites to pieces and put to the ground-ivy, then beat them again. Put in half a pint of mountain-wine, and a quarter of a pint of rose-water; and add an ounce and half of white vitriol, and the same quantity of white sugar candy first beat to powder in another mortar. Beat all these well together, and then put them into an earthen pan. Strew some basket salt, about an ounce, over them, and covering the pan set it in a cellar to remain six hours. Then make a bag of thin flannel like a jelly-bag, hang it up and set a pan under it. Pour in all that is in the pan, and there let it remain till the whole liquor is gone through without squeezing.

Put this up in a bottle, and every morning and evening drop some of it into the horse's eyes, and rub them gently with it, dipping the end of a soft feather into it for that purpose.

C H A P. XXIX.

*For a film growing on the eyes.*

**B**OIL an egg hard; separate the yolk and chop the white to pieces. Mix with it some basket salt, and put it into the shell of another egg that can be kept whole, and set it over the fire.



fire. Let it stand till it will come to a powder. Mix this with two ounces of honey and three grains of white vitriol in powder. Put this a little at a time into the eye with a feather, and it will often make a perfect cure. This must be done as soon as the disease shews itself; for it is not to be depended upon afterwards.

## C H A P. XXX.

*For cramps.*

**C**RAMPS are discovered by the creature's uneasiness, and by the drawing up of his limbs. Put into a large bottle a pint and half of vinegar and a pint of oil; shake them well together; then wet a woollen cloth with them and wrap it round the limb. If the cramp do not go off before this is dry, repeat the same thing, wetting the cloth well again, and it rarely fails to compleat the cure.

## C H A P. XXXI.

*For the anticor.*

**T**HIS is a pain in the breast of a horse, often very troublesome, and frequently the forerunner of danger. It rises from the eating too great a quantity of rich fresh food: as when a horse has been turned loose at once into a clover field: the cure is this. First bleed him moderately; and then give him the aloe purge before directed. If he is not much better let him be blooded again the day after, and the purge be repeated, as there may be occasion; and all the time let him have moderate wholesome diet, and some exercise.

This disorder in horses is very like a surfeit in our own species, and is to be cured in the same manner: nothing is required but cooling and opening the body: and if this be not done the disorder will gather strength, and much worse will follow. The farmer will easily know by the horse's going, whether he is growing worse or better. If he faulter in his legs, and have a stiffness in his neck, all is going wrong: if he take frequent tremblings, it is worse: the bleeding must then be repeated immediately, and the purge must be given every other day till he is well. The quantity of blood lost at two, three, or four bleedings upon such an occasion, will never do the creature any harm; and the cure entirely depends on it.

## C H A P. XXXII.

*For sickness at the stomach.*

**T**HIS disorder is usually owing to the eating fresh meat too carelessly. I have seen a horse from an over-feeding upon clover cast up all he takes both of food and water; and in this manner



manner he will go on to his destruction, if not timely remedied.

Make a quart of ale hot, and dissolve in it half an ounce of venice treacle, a quarter of an ounce of philonium romanum, and a dram of powdered cinnamon. Give him this as a drench; and if it stays upon his stomach, give him an hour afterwards a feeding by hand of small bits of bread, and a very little lock of hay. This will continue upon his stomach, and he will recover.

If the drench did not stay upon his stomach, give him the following. Heat half a pint of red port wine with a lump of sugar: put into a bason three drams of salt of wormwood, squeeze in four lemons, and stir it about till the salt is dissolved: then when the wine is boiling hot strain this to it, and give it him for a drench. This will be sure to stay upon his stomach, if the other does not; and afterwards he is to be fed as before directed.

### C H A P. XXXIII.

*For the yellows.*

**T**HIS arises from an overflowing of the gall, and it may be called the jaundice in horses; for it proceeds from the same cause as that disease in our own species; and is to be cured by the same kind of medicines. It first shews itself by a yellowness in the horse's eyes. Then the skin of the under part of his upper lip next to his fore teeth is tinged yellow; and then he grows faint and unable to perform his business. He will fall down as he is in the stable, be covered with sweat as he stands still, and often shiver.

Beat in a mortar a hat crown full of fresh great celandine; add to this four ounces of powder of turmerick and a pint of white wine. When all is well beat together press out the juice, and put to it in a large bottle one dram of powder of saffron, and the clear juice of four lemons. Shake all well together. Bleed the horse in the neck moderately; and an hour after give him for a drench a pint of hot ale and a quarter of a pint of this mixture. Let the same be repeated every night and morning till he is perfectly recovered; giving him moderate exercise.

### C H A P. XXXIV.

*For the swelling of the spleen.*

**T**HIS disorder renders a horse feeble and untractable: he faints in the stable, loaths his food at some times, and snatches at it voraciously at others; and he is frequently looking to his left side, lying down upon it, and rubbing it against any thing. The herb agrimony is a certain cure: but it must be taken for some time. The disorder rises from an obstruction in the spleen.



Gather a good quantity of this plant fresh out of the fields, and cut off the tender tops. Beat these in a mortar, and add a little sugar, make them into a conserve, and set this by. Then pound the rest of the plant, and mix some beer with it by degrees as it is beating: and when it is all a mash press out the juice. Roll up a ball of the conserve, and rubbing it over with butter give it to the horse in the manner of a pill. After it give him half a pint of the juice pressed out as before directed and made warm.

Let this be repeated every morning and night; and give him moderate food and good exercise. He will not be able to bear the exercise well at first, but he will do better daily: and by that it will be seen that he is growing well: the course must be continued till he is quite recovered; which will be known by his leaving off rubbing and looking at his left side.

## C H A P. XXXV.

*For the heat of urine.*

**T**HIS is the same with the strangury in our own species: it is to be cured easily if taken in time. I have observed it very often in autumn, and scarce at all any other season in the year; and I am convinced it is owing to certain insects the cattle of many kinds eat at that time, in cropping the young shoots of trees, shrubs, and hedges.

Every one knows that the taking of the smallest quantity of the drug called cantharides or spanish flies, occasions a stoppage and heat of urine. Cantharides are a kind of green beetles found upon bushes in Spain; and we have the same kind, but smaller, in England. They live among the young shoots of trees at that season; and are swallowed up by the horses that crop them: a heat of urine comes on, and the horse is in terrible pain: the part swells and inflames, and he is continually wanting to make water, though he can make only a drop or two. His blood is inflamed at the same time; and if due care be not taken, the consequences will be dangerous.

Chop to pieces four pounds of the roots of fennel, six pounds of the roots of mallows, and two pounds of the roots of parslly. Set them on to boil in a copper with eight gallons of water, and put in three pounds of french barley. Let them boil together half an hour, stirring them well about: then when the whole is a little cooled strain off the liquor, and squeeze it hard. Give the horse equal quantities of this liquor and milk mixed together warm for his drink; and let him drink as much of it and as often as he will. The heat of his blood will make him thirsty, and the quantity he swallows will soon be a cure.

C H A P.



C H A P. XXXVI.

*For difficulty of urine.*

**T**HIS is a disorder the farmer must not confound with the other : they somewhat resemble one another ; though they have different causes, and require a different cure. The former is an inflammation : this is an obstruction by gravel.

It is seen by the creature's straining very hard to void his urine, and often without being able to make any. Let the part be examined ; and if there be no heat or inflammation, this is the case. Also if the disease be of more continuance ; and if the horse can sometimes void a great deal. Boil a large quantity of French barley in water, and mix the liquor with all the water he drinks ; and give every morning the following drench. Take juice of arsmart and parsley-pert, of each a quarter of a pint ; sweet oil six spoonfuls, and oil of turpentine half a spoonful ; give it warm, and an hour after let him drink plentifully.

C H A P. XXXVII.

*For bloody urine.*

**T**HIS is generally owing to over-working ; especially when with a great deal of work the creature is fed poorly. Bruise a large quantity of that wild cranesbill, which is called herb Robert : squeeze out the juice, and add to every pint half a dram of alum powdered, and two drams of dragons blood. Give half a pint twice a day till he is well.

C H A P. XXXVIII.

*For the vives.*

**T**HIS disorder is a swelling in the kernels, between the chop and the neck. It proceeds from cold ; and when it is attended with much inflammation may be dangerous. Bleed him largely, and pour into his ears juice of rue mixed with a good quantity of pepper. Tie the ears round to keep it in ; and if he be not better the next day repeat the bleeding, and afterwards give him the common purge set down before.

C H A P. XXXIX.

*For soreness in the nostrils.*

**T**HIS disorder is very troublesome to horses at grass ; and those are most subject to it which are fed in low wet grounds. It is to be cured by an outward application in this manner. Bruise some plantain and press out the juice. To a pint of this put a pint and a quarter of vinegar, and two drams of alum. Mix all well together ; and first wash the part clean : then anoint and rub it gently with this liquor. Repeat this



every day once or twice ; and if it do not take speedy effect put in more of the alum : according to the nature of the disorder more or less will be required ; but this is generally sufficient.

## C H A P. XL.

*For bleeding at the nose.*

**T**HIS is an accident to which horses are liable, in the same manner as our own species ; but it is usually much more violent. It is to be treated according to the degree of it in a different manner.

If it be very violent the horse must be blooded in the flank. While he is bleeding the following mixture is to be prepared. Bruise in a mortar equal quantities of clown's allheal, and wood betony, add to it a little salt, a little allum, and some colcothar of vitriol ; when all is beat together thrust some of it up the nostril that bleeds, and keep it firmly to the place till it is stopped.

As there may be danger of its breaking out again in the night, there should be a quantity of the same mixture thrust up in the evening, and by means of a bandage it should be kept in. When the occasion is less violent the bleeding may be trusted alone ; and when most flight of all the herbs pounded without any addition will answer the purpose.

## C H A P. XLI.

*Of disorders of the mouth.*

**A** Horse is subject to various disorders of the mouth, known by different names : some require the hand of the farrier ; but the greater part may be cured by the farmer himself. The growth of bad flesh over the gums, which is called the lampass, is to be remedied by burning with a red hot iron : for this the smith or farrier is fittest, because practice is the best director. For those cracks and warts in the palate, and little pustules and inflammations, the remedy is this. Gather a good quantity of fresh leaves of wormwood, stamp them and press out the juice, mix an equal part of this and of Ægyptian ointment, and stir these well together ; then, with a piece of rag tied to the end of the skewer, rub over the parts that are sore, and they will be cured in a few times dressing. Swellings under the tongue are cured in this manner.

## C H A P. XLII.

*For loose teeth.*

**T**HE teeth of a horse will be sometimes sore, so that he cannot chew his meat, or they will be loose ; these are  
great



great inconveniencies, and must be remedied so far as may be, as soon as they are perceived. For soreness in the teeth use the following wash. Gather some leaves of wood betony, and boil them in ale till it be very strong of them: then strain it off, and mix with it an equal quantity of the sharpest vinegar. Heat this as hot as can be borne, and wash the gums about the roots of the teeth with it every night and morning: feed the horse for some days with the softest food that may be, and then leave him to his common life again.

This is a remedy for soreness of the gums; but when the teeth come to be loose the case is much worse. After the gums have been well washed with the liquor before directed, bring in some fresh leaves of elecampane, and rub the teeth and gums with them: sometimes this will take effect. Let the horse be blooded, and let him be fed for some days with soft meat; as boiled oats, and the like things: for the not forcing them is a very great article in the cure.

### C H A P. XLIII.

*For foundering.*

**T**HE cause of foundering is commonly hard service and bad management; from these joined together the creature gets a disorder in the feet, so that he is hardly able to stand: he will quake and totter; and will be scarce able to keep up in going.

The farmer should have a particular care of those things which occasion it. The setting up a horse when very hot in a cold stable without litter is one cause. The riding him into shallow water, and letting him stand with his feet under it a considerable time when very hot, is another; and many other careless tricks of the same kind may have a like effect.

Besides these there are other accidents that will occasion it: as the wearing strait shoes, and travelling a great deal upon very rough and hard ground. Sometimes a horse is foundered on all his feet: this happens from the standing in water when hot; but more usually he is foundered only on his fore feet: sometimes the foundering is only on the hinder feet; but this is less common.

When he is foundered on the fore feet he rests upon the hinder ones as much as possible, and is careful how the fore feet go to the ground: and when the hinder feet are affected, he rests himself almost entirely on the fore; not letting the others come down hard at any time. This complaint is also known by his seeming weak behind as he goes.

The method of cure is this. Let the horse be taken to a



careful farrier, and let the owner stand by, to see his operations. He is to pare away the hoof gently till he comes to the quick, and then to bleed the foot in four or five places at what they call the toes. This being done, put into an earthen pipkin equal quantities of tallow and yellow rosin; let them melt together perfectly: then lay on a quantity of this upon every part whence the blood came.

This done, let hollow shoes be put on; and let another pipkin be set on with equal quantities of tallow and tar; when these are well melted together put in some bran, and stir all again. Then make this very hot, and stop the hollows of the shoes with this. Let this be repeated every day for eight days, during which time keep him quiet and give him moderate food.

After this bring him to more exercise by degrees. Sometimes this method will make a cure, but not always; for there are stages of this disorder which nothing can relieve.

#### C H A P. XLIV.

##### *For wind-galls.*

**W**IND-GALLS are a disorder of the feet, brought on by travelling in hard ways. There are little soft swellings containing a kind of jelly, on each side of the fetlocks. The remedy is easy. They must be opened to let out the matter, and then dressed with a piece of black pitch spread upon leather.

The common practice is to prick them with a nail, but this is very injudicious. Let the farmer follow the practice of the surgeons; for the business is of the same nature, and they have best studied how to perform it. When they are called to open a swelling, they do not perform this by pricking it, or making a small hole for the matter to come out; but they cut it with their lancet all the length; and sometimes again cross-wise: this lets out all the matter, and gives the dressing its full power. In the same manner in these wind-galls, and all complaints of the like nature, let the farmer open the swelling from top to the bottom; and when the matter is fully and entirely out then put on the dressing. In this case the whole malady is remedied at once; for the horse is well by that time the plaisters come off, which they will of themselves in a few days.

I have heard farmers complain of these wind-galls returning again and again after pricking; and in this case they will disorder the feet of a horse at length to his destruction: it is owing to this method of pricking instead of lancing: in that case all being cleared there is no fear of a return; but when the swelling



swelling is only pricked a part of the matter is left behind; the hole presently fills up, and then there is a fresh gathering; and this as often as it is discharged in that wrong manner.

C H A P. XLV.

*Of the anbury.*

**T**HIS is a swelling or pustule, like a bloody wart upon different parts of the body of a horse, and is owing to accident, without any distemperature in the blood. The cure is this. Bruise some plaine leaves, and press out their juice. Mix three spoonfuls of this, three of vinegar, and two of honey; and stir in half an ounce of powdered allum. Burn down the wart with a red hot iron, close and even to the body; and then anoint it with some of this mixture. Repeat this anointing night and morning till it is well; and it will never return.

As this distemper is sometimes attended with a bad state of the blood, a further caution is then necessary. The farmer may be satisfied nothing more is amiss, if the anbury is perfectly and soon cured by this method, and does not appear again in other places, but if the complaint rises in one place, when it is cured in another; and especially if at the same time the creature be gross, full of foul humours, and have other disorders upon the skin, there must be care taken of the whole mass, as well as of these single eruptions. Let the horse be blooded; then let the several anburies be burnt down and dressed in the manner we have directed, and let there be flower of brimstone and crude antimony in powder sprinkled amongst all his food.

During this let the owner watch the appearance of others breaking out; and always burn them down as they come.

C H A P. XLVI.

*For a general decay.*

**S**OMETIMES a horse will fall into a general decay, without any apparent cause: he will be weak and faint, his coat will grow rough, and he will lose his flesh till he seem dying: this is to be remedied, if taken in time, by the following medicine:

Take six pounds of fine wheat flour, mix with it two ounces of aniseeds in powder, and three quarters of an ounce of cummin seed, also powdered; seeds of carthamus powdered, a dram and half; fenugreek-seed an ounce and half, flour of brimstone two ounces, powder of vipers three ounces, powder of saffron one dram, and powder of cochineal a dram and half. Mix all these powders perfectly together, stirring them about; and



then put to them a pint of fallad oil, a pound and half of honey, and two quarts of white wine. Work this into a paste, adding a little flour, if it be too soft; and a little wine, if it be too hard: when it is well wrought, make it up into balls of the bigness of a man's fist; and give the horse one of these every morning in the water he is to drink, and the same every evening. Let the water be cold, and if he dislike it, give him no other. When he is thirsty he will take to it. The getting him once to drink it is all the difficulty, for he will afterwards like it better than any other. In this manner he will be perfectly cured in three weeks; and will recover his flesh and spirit. Care is to be taken that he be kept upon good food, and have gentle exercise, but never to fatigue him; and that he lie clean and dry.

## B O O K XIII. S E C T. II.

## Of C O W S and O X E N.

## CHAP.

1. *Of the fever.*
2. *Of binding of the body.*
3. *Of loosenesses in general.*
4. *For a common looseness.*
5. *For a looseness with sharp stools.*
6. *For a looseness with bloody stools.*
7. *For a looseness with great heat of body.*
8. *For the obstruction of the liver.*
9. *For bloody urine.*

## CHAP.

10. *For a running at the nose.*
11. *For worms.*
12. *For worms in the tail.*
13. *For boils on the flesh.*
14. *For disorders of the lungs.*
15. *For a foulness of the skin.*
16. *For falling of the palate.*
17. *Of hurts in the feet.*
18. *Of the panting evil.*
19. *Of the yellows.*
20. *Of the gargil.*
21. *Of the garget.*
22. *Of the murrain.*

## The I N T R O D U C T I O N.

**T**H E S E creatures are not liable to so many disorders as the horse; but there is nothing of greater importance to the farmer than a right knowledge of those to which they are subject. A distempered cow or ox are worth little. Most of their diseases, as they are of a more simple nature than those of the horse, are easier of cure: but there are some which we see mock all the art of physic, and all the rewards a government can propose for devising a remedy. The fatal disorder that has now raged so many years is a terrible instance.

We have examined this with all the attention so weighty an affair demands; and hope we shall be able to propose something

on



on that head worthy the attention of the farmer and of the public. We shall begin with diseases of a less terrible kind, that the husbandman may be led, by degrees, to the most difficult.

C H A P. I.

*For the fever.*

**T**HE farmers find their cows and oxen subject to fevers; and these, though they generally will go off kindly by assistance, often are of very bad consequence when neglected. The most common occasion is a surfeit, and sometimes they will seize them without any visible cause. The creature foams at the mouth and hangs down the head; the eyes look heavy, and the whole body trembles: and it frequently groans very mournfully and heavily. It is hot and restless, and does not care for food, but is continually desiring to drink.

Most other disorders are attended with a fever; therefore it is natural that feverish symptoms appear with them: let the farmer, when he sees these signs, first examine whether there be not some others belonging to those disorders, we shall describe hereafter: if there be, then he is to level his remedies at the disease they indicate; those signs of a fever being symptomatic: and as the other disorder is the real cause of them, when that is removed they will go off.

When there are the signs of a fever only, he will find the following method of cure successful. Bleed the creature: and as to the quantity, that is to be guided by the nature of the disorder, and the condition of the body: if it be a very violent fever, more blood is to be taken away; if less violent, less: and if it be an ox, he may be blooded more freely than a milch cow. A quart of blood may be very properly drawn from the former; but it is a general and wise rule, that there never should be more than a pint taken from the latter. Though, if the symptoms encrease, the bleeding may be repeated after four and twenty hours.

When the creature has been blooded, set it up warm, and give it no victuals. Boil, in six or eight gallons of water, a basket-full of plaintain-leaves and roots, and half a dozen handfuls of agrimony, strain them off, and let the creature drink of this, warm, as often as can be.

The next day give a quart of ale, with half an ounce of venice treacle in it; and repeat this once in eight hours. Give some very fresh hay, sprinkled with cold water, after all this; and, by degrees, the beast will grow well.

During all the time the lips must be frequently rubbed and  
cleaned,



cleaned, for they furr with the heat, and unless this care be taken, it will not eat or drink. Let the creature be kept up till perfectly recovered, and after that let it be taken some care of several days.

## C H A P. II.

*For binding of the body.*

**T**HIS is a distemper to which these cattle are very little liable, but when it does happen, it is to no creature so dangerous. If the purges used for horses, be given to cows and oxen in this case, they bring on a disorder in the other extreme, that is much worse than the first.

The following is a safe and excellent medicine. Take a quarter of a pound of ordinary manna, melt this in a pint and a half of ale, put it into a bottle, and add to it half a pint of sweet oil, and six ounces of lenitive electuary. Shake all very well together, then pour out a gill and half of it: warm this, and give it every morning and night till half the quantity be taken: and then every morning only till the remainder is taken. This never works as a purge, but it gently produces the effect, bringing the creature's body to a due condition; and as this is brought on gradually, it is sure to continue.

## C H A P. III.

*Of loosenesses in general.*

**T**HIS is a disorder to which cows and oxen are more liable than the former; and it is difficult of cure, if not taken in time. When it first comes on, it affects them no other way than by making the discharge thinner, while it retains its natural colour: after this it becomes paler and sharper, giving the creature great pain; and after that the stools grow bloody. These are the three stages of the distemper. The farmer is to regard them carefully, for there is to be a different course of medicines for each.

## C H A P. IV.

*For a common looseness.*

**B**OIL half a pound of fresh roots of bistort in two quarts of water. Strain off the liquor, and add four ounces of whiting, and an ounce of diascordium, made without honey: give the creature half a pint of this, warm'd and well shook up, three times in the four and twenty hours, till the complaint ceases. Sometimes a single dose performs a cure; but in that case it will be proper to give another dose, morning and night, for two days, to prevent a return.

C H A P.



## C H A P. V.

*For a looseness with sharp stools.*

**I**F the former medicine have not stopped the disorder; or if the farmer have not observed it till it comes to the second stage, that is, till the stools are sharp and discoloured, the following remedy is to be used.

Bruise half a pound of the dry root of tormentill, and boil it in two quarts of water to a quart. Squeeze this off, add to it a quart of rough red wine: add also a quarter of a pound of whiting, two ounces of diascordium without honey, and one ounce of japan earth. Shake this very well together. Warm it every time it is given, and let the cow have half a pint for a dose, three times a day, till perfectly recovered.

## C H A P. VI.

*For a looseness with bloody stools.*

**T**HIS disorder sometimes comes on at once; but more frequently it is the consequence of neglect, or wrong medicines given for the others; or of the violence of the disorder.

The course of the disorder is this: a sharp humour falls upon the bowels, and the stools are thin and cutting. After a time they wear off the slimy coat of the bowels, and then what comes away is discoloured: after this they wear the very insides of the guts themselves, and then come bloody stools. This is the last and worst stage of the distemper.

The following method is to be taken: first let the creature be bled, but not largely; then prepare this medicine: bruise half a pound of dry roots of tormentill, six ounces of dry pomegranate bark, and two pounds of the leaves and roots of plantain. Boil these in three quarts of water to two. Then put in two ounces of cinnamon pounded: let it boil a few minutes longer, and then take it off. Set it by to be cold, then strain it off; add to this three ounces of dragon's blood, in powder, and a quarter of an ounce of roch-allum. Shake all thoroughly together; and when it is to be given, warm a gill and half, and give it three times a day.

## C H A P. VII.

*For loosenesses with great heat of body.*

**W**E have named the symptoms of a fever in these creatures; and they may happen with other disorders. A purging is one of those, and in that case it is not to be treated as a fever alone, neither is the disorder to be considered only as a purging: a due regard is to be had to both.

Slice



Slice six ounces of the root of the herb called avens, or herb bennet. It is not sold at the druggists, but is common on ditch-banks. The flower is little and yellow; the head is a small burr; and the root smells like cloves. Let this be boiled in three quarts of water to two quarts, adding, toward the end of the boiling, an ounce of fine cinnamon, and two ounces of chips of logwood. Strain off this liquor, and add to it an ounce of powder of virginian snake root, and a pint of red port wine. Give the creature half a pint, warm, twice in twenty-four hours.

## C H A P. VIII.

*For the obstruction of the liver.*

**T**HIS is what the farmers call by the general name of an inward sickness. An uneasiness is seen in all their actions; and a lazyness or unwillingness to move. To this is to be added a scurfyness, and harsh dryness of their lips, and a dryness of their noses in a morning.

When these cattle are well, in the morning, there is a drop of dew, like a pearl, hangs upon the nose; but when they are sick it is wanting. No disease sooner takes the effect of getting off this mark of health, but it is not peculiar to this. The remedy is this:

Take a pound of great celandine, dug up with the roots, cut it all to pieces, and put it into a pot, with two gallons of water, let it boil up a few minutes; then add half a pound of madder root, ten ounces of turmeric, and four ounces of fresh roots of fennel. Boil these very well, and strain off the liquor. Get a hat-crown full of wood-lice, pound these with a pint of white wine, and squeeze out the juice, then add this to the strained liquor. Shake this up every time it is to be used, and warm half a pint of it for a dose. It should be given night and morning for ten days. This is the usual time required to perform a cure: it may be sooner, or it may require a few days longer; but the medicine will hardly fail.

## C H A P. IX.

*Of bloody urine.*

**T**HIS is a disorder to which cows are very liable, and, if not taken care of in time, it is fatal. The method is this:

Take the cow into a warm house, where she is to be kept till cured. Bleed her three quarters of a pint, and then give the following medicine: gather a basket-full of that sort of cranesbill, called herb robert. Stamp it in a marble mortar, and



and press out the juice; give the cow a quarter of a pint of this every morning and night: it generally will perform a cure in about three days.

It is a kind of specific for the disorder, and cures with surprising quickness: but there are some cases in which other disorders bring on this bloody urine, and then this medicine does not answer. Let it be tryed only six or seven doses, and if that do not succeed, have recourse to the following.

Boil in a gallon of water a great quantity of the same herb robert, and as much shepherd's purse. When they have boiled well half an hour, put in a good stick of cinnamon; and after boiling a few minutes longer, set it off the fire. Then strain it and set it by to cool. Dissolve in this two drams of sugar of lead, and add one hundred drops of spirit of vitriol. Shake all well together, and give the creature a gill of it cold every four hours, till the cure is perfected.

#### C H A P. X.

*For running of the nose.*

**T**HIS disease which grows to a terrible height in horses, under the name of the glanders, is very slight in these cattle. It proceeds from cold, and as they hold their heads down it is not easily cured, and will encrease upon them in time, if not stopped.

Take the creature up, and let it be kept warm. Bleed it about a pint, and then give the following: boil a pint of ale, and dissolve in it half an ounce of venice treacle. Give it warm, and let it be repeated every night and morning. Give the creature good provender, and use the following application to the part. Melt some fresh butter; and stir in as much flower of brimstone as will make it a thick ointment. Rub some of this all over a couple of goose feathers, and warm them a little before the fire; anoint the inside of the nostrils every morning and evening with this, till the disorder ceases.

#### C H A P. XI.

*For worms.*

**C**OWS and oxen are subject to have worms in their bowels, and are greatly disordered by them; they will prevent their thriving, and make them restless and untractable. The remedy is this: chop to pieces some savin-tops, and leaves of bear's foot, mix with these a little salt of steel, and work up the whole into a sort of paste with butter. Divide this into small balls, and give one of them every morning early for a week



week or longer : keep the creature without meat three hours after, but let it drink as much as it chuses.

If this medicine do not succeed alone, it must be assisted in the following manner : dissolve half an ounce of black soap in a quart of sweet-wort, and give this every morning after the ball of savin. In this manner the cure will usually be perfected in a few days.

## C. H A P. XII.

### *Of worms in the tail.*

**B**ESIDE worms in the bodies of cattle, there are a very troublesome kind that breed and live externally in the tail. They torment the creature, waste their strength and spirits, and keep them pining. They usually grow lean ; their backs become weak ; when they are lain down they are scarce able to get up again, and they have a faintness in their looks and motions.

When the farmer sees a cow or ox in this condition, let him examine the under parts of the tail. He will perceive the hair is fallen off ; and that there are a multitude of little sores ; and, upon further examination, he will see the tail is almost eat asunder in several places at the joints.

This might seem a natural ulcerated state of the tail ; but it is, in reality, owing to eating worms, which will be found easily enough upon looking after them. They are occasioned by foulness of the tail, which tempts a particular kind of fly to lay its eggs there. The condition of the tail draws more flies to blow it, like meat that begins to putrify, and thus the disease continually encreases.

It is only in summer the disorder takes its rise ; though, when once established, it will continue at all seasons. Precaution is in all these cases easier and better than a cure : it is foulness on the under part of the tail in cows, that first brings the flies to them. It is therefore the business of the farmer to remedy the disadvantage.

The dung of the cow and her urine, will hang upon this under side of the tail ; and after calving, there will be also greater inconveniencies of the like kind : let a person be employed, once in three or four days, to clean the tails of the milch cows, in particular in this part, and of the oxen, as there may be occasion. This will be very agreeable to the creatures : and there will be no such thing as the tail worm known. Cleanliness will not only prevent the disorder, but in the first stages will cure it. The best washing is performed by brush and soap suds, and if a few of the worms should be bred,



bred, this will perfectly destroy them. We hope the farmer will take this care; but as a neglect may have happened, or the disorder may have some way got footing, we shall deliver also the remedy.

Chuse a pound and half of fresh new made stone lime. Boil a gallon of water, and pour it all at once upon the lime in a very large earthen pan. It will bubble up: stir it well, cover it when cold, and let it stand all night to settle; there will be a very strong lime water, though but a small quantity of it. In the morning let it be poured clear off.

Take up the cows that have the disorder, and keep them dry while they are under cure. Make a very strong lather of soap suds in soft water; and first of all with flannels, and afterwards with a brush wetted in these suds, wash the tails in every part perfectly clean; and the more to promote the cleaning of them, cut off the hair as short as can be.

After the tails have been thus cleaned and are dry, wash them in the same manner with this strong lime water. Observe after four or five days, whether the disorder be cured; if not farther methods must be taken. Once a day will be enough to dress the tails by these two washings, but it must be every time done in this careful manner. If these fail the following method is to be used.

Stamp a good quantity of the fresh tops of rue and favin; when they are reduced to a paste, add a little white hellebore and stone ocre, both in powder, and some wood foot and a little salt. Beat all this up again, and then mix in some butter. When this is ready, and the tail perfectly cleaned, let it be slit along all the way down the inside, nearly to the bone, and then very thoroughly anointed with this. If this does not cure in three or four times, let the tail be rub'd with a small quantity of the common blue ointment, made of quicksilver, Venice turpentine, and hog's lard.

These several methods are to be tried one after another. Usually the first succeeds, if not, the second rarely fails; but if none will do, the last resource is to cut off the tail. But it is best to fatten up the beast after this for sale directly.

### C H A P. XIII.

*For boils on the flesh.*

**C**OWS are subject naturally to large and painful boils; and sometimes they fall into the same misfortune, by means of a fly. When boils come naturally on a cow or ox, the thickness of the skin, and the cold constitution of the animal make them ripen slowly, and they heal slowly afterwards. Nature



is to be assisted in the following manner. Take up some white lilly roots, and boil them in milk and water till they are perfectly soft. Then lay them hot upon the boil. Bind them on if that can be done conveniently, if not let a person hold them on till they are cold. This is to be repeated as occasion requires; the oftener the better; and the boil will ripen and come to a head.

The opening of a boil when it is in this proper condition, may be done either by a knife, or a red hot iron: the general practice is by the latter method.

When the matter is discharged, let it be dressed with the following ointment. Put into an earthen pipkin half a pound of tar, three quarters of a pound of horse turpentine; set it on a gentle fire, and as it melts throw in two ounces of hog's lard. Stir all well together, and dress the part every day with this warm, till it is healed.

The boils occasioned by flies, are much more wonderful than any thing relating to this creature, and the discovery of it was made by Mr. de Reaumur, of the royal academy of sciences at Paris, and is delivered in the fourth volume of his memoirs. The same thing happens in England, and what we see verifies his accounts.

There is a large fly that in autumn teazes the cattle prodigiously. It settles upon them, and lays its eggs in a small wound, that it makes for that purpose in the skin. These eggs hatch in time, and the part swells with the hurt. A cow shall thus be covered with filthy boils, while its blood is in a perfect good state, and this accident the only cause of it. There is a maggot in every one of these boils, which feeds upon the matter bred there till it is of full growth, and then crawls out and takes its chance for appearing in the fly state.

There is no need to suffer the creature to be tormented in that manner till the maggot goes out of itself; but the assistance of a careful hand should be given to clear her of the boils at once. Every one of these should be opened with a sharp knife; and the maggot taken out. The wound is then to be dressed once or twice with the ointment before directed, and the creature will be perfectly freed from the torment.

#### C H A P. XIV.

*For disorders of the lungs.*

**T**H E S E are of various kinds in the cow and ox kinds, but one remedy will serve for them all. Sometimes the creature breathes with difficulty, sometimes coughs and wheezes. Bruise four heads of garlick, and press out the juice, mix this with a  
quart



quart of new milk, and add a quarter of a pint of tar. This will serve for four doses. One is to be given every morning till the cure is compleated. The tar does not mingle well with the rest, but these are not very nice creatures, so it goes down. If the disorder be obstinate, the creature should be blooded, and the medicine will then take effect.

C H A P. XV.

*For foulnesses of the skin.*

**C**ATTLE of this species are not altogether free from blotches, scurf, and scales on the hide. They must instantly be taken care of, for the beast can never thrive that has them.

First let the cause be considered, which is often want of cleanliness, sometimes a disorder in the blood; and in some cases it is owing to both. Foulness of diet is the common cause of this disorder in the blood; and this is usually occasioned by that sort of rank grass which grows in wet places.

Let the first thing be a change of pasture: from a low ground full of rank weeds, and abounding with mud, remove the cattle to a high dry pasture, where the grass is sweet, and the soil gravelly, so that there can be no dirt for them. If the disorder be owing to uncleanness, this change alone will cure the cattle.

If the blood be concerned, let the creatures be blooded: about a pint and half from the ox, and half that quantity from the cow. Then let them be taken in and perfectly cleaned. Warm soap suds, a soft brush and flannels are the proper remedies for this foulness, or they are the needful preparations for others.

When the cattle have been cleaned, if any scales remain let them be picked off; and the next day the washing be repeated. This, and the cleanness of the pasture, will answer this first purpose.

Next day let the creature be washed well over with the lime water; and if any of the scabs have grown to a bigness since they were picked off, they must be rub'd again, that the lime-water may get to the root of the disorder. Let this be repeated three times, at two days distance; and let there be some flower of brimstone sprinkled among the hay that is given them in a morning. In this manner their blood will be sweetened, at the same time that the outward remedies perfectly cure the disorder.



## C H A P. XVI.

*Of falling of the palate.*

**T**HIS disorder frequently seizes cattle after hard labour and colds, and is of a very troublesome nature, if not provided against in time. When the palate is first fallen it is not difficult to replace, and keep it up; but when it has been any time down the difficulty of putting it up, and the readiness to fall again, are very great. I have known an ox obliged to be killed when it was not intended, nor was he fit, because he would otherwise have been starved by the continuance and relapses into this disorder.

The farmer will perceive the creature has this disorder by its great uneasiness, and a particular kind of hollow groaning: he will be continually striving to eat, but not able to swallow, and thus without care he would go on till entirely starved.

The remedy is this; cast the creature, and getting the hand into his mouth replace the palate as it should be: then rub over it some honey and pepper mixed together, and let him rise again: half an hour afterwards bleed him a pint and half or more; and thus the complaint, if taken in time, is commonly to be cured without any danger of a relapse. He must not be fed with hay, but for some days only with fresh sweet grass.

## C H A P. XVII.

*Of hurts in the feet.*

**W**HEN a cow or ox is observed to limp, and keep one or more of his feet from the ground, the occasion usually is some complaint about the hoof, and nothing is so common as a soreness between the cloves.

Cast him, and clean the space between the cloves perfectly well, rubbing it till it bleeds. In the same manner clean all about the foot. Then chop a quantity of the leaves and tops of mugwort, boil them soft in milk and water, and put some in between the cloves, and some about the whole hoof, tie it on, and let the creature be kept quiet. The cure is generally compleated at one dressing. Some accidental foulness is often the cause; so that cleaning it, and laying on a soft healing cataplasm, is a very natural remedy. When the case is worse, and there are actual sores, clean them as already directed, and then dress them with a quantity of black basilicon spread all over some tow, and drawn in between the cloves. This should be repeated every day.



C H A P. XVIII.

*Of the panting evil.*

**T**HIS disorder shews itself in the creature's faintness and unwillingness to stir; in his frequent panting, and as it were sighing. It renders the creature weak, and he generally wastes in flesh. The remedy is this: boil a quart of ale, and dissolve in it half an ounce of mithridate, and a scruple of powder of saffron. Give this warm every morning for four times: the creature must be fed upon dry sweet hay, and have his drink warm during the cure.

C H A P. XIX.

*Of the yellows.*

**T**HIS is of the same nature with the jaundice. It is perceived first by a yellowness in the eyes; and in the lips; and the creature is always lazy and weak.

Bruise in a marble mortar a basketful of great celandine roots, leaves and stalks together: add to this a good handful of rue, and then squeeze out the juice. Mix with this an equal quantity of juice of wood lice, and give the beast a gill and half of it every morning, for a week; and afterwards every other morning for a week longer. In this time the cure is generally compleated, and there is no danger of a return of the complaint.

C H A P. XX.

*Of the gargil.*

**T**HIS is a terrible disease, and more difficult of cure than most others. It is an external swelling and inflammation; but the blood is always concerned; and the disorder spreads and defies all outward remedies. It appears first in the lower part of the dewlap, in a hard inflamed lump, which spreads till it occupies the whole dewlap, and reaches to the throat, in which case it is often fatal.

This is the disorder called the gargil. It affects the dewlap and throat only; and it is the first step to the most dangerous disorders; but it is of a distinct nature in itself, too often destroying the cattle without encreasing to any greater degree of malignancy.

The gargil and garget are treated by writers, as the same disorder; but this is the distinction.

The gargil is a swelling in the dewlap and throat, extending no farther; the garget is a swelling of the head and eyes, with other external parts, with inflammation; and the murrain is



the same swelling and inflammation, extending itself also to the inside of the throat, the stomach, and the bowels.

This last is the distemper now, and of many late years so fatal among the horned cattle: it becomes the farmer to understand it in all its progress; and if the physicians who have written so much about it had descended from the closet to the cow-house, they would have found the same facts; and knowing something of the cause, they would have been more likely to have made a proper judgment as to the method of cure.

The state of the three distempers is this. The gargil can never change to the garget; and if ever it seems to do so, it is that the farmer has observed the throat more than the head and eyes, when they have been also affected, and the disorder has been the garget all the time, while he took it for the gargil. The gargil very frequently changes into the murrain; but the murrain may begin without it. A swelling of the outer parts of the head and neck, which is the garget, may spread inwards, and be converted into a murrain; or the inflammation and swelling may begin in the inner parts, and then it is most dangerous, because least seen; and is most infectious because the breath conveys it to all which have their heads near: this is the murrain appearing in its proper form; and is of all the most fatal.

As soon as the gargil is perceived, let the following ointment be prepared. Melt together equal parts of pitch and turpentine, and add a small quantity of bees wax. Slit open the dewlap three inches in length where the swelling is, and let it bleed freely. Bruise in a marble mortar a handful of the leaves of the great black hellebore, and add to them some hog's lard: beat the whole up, and thrust in a good quantity into the slit. Sow up the wound to keep in the ointment, and keep the creature clean, warm and quiet for two days. Then open the stitches, take out the remains of the hellebore, and melt some of the ointment just directed to be made: dip a large pledget of tow in this, and put it into the wound hot. Repeat this dressing every day till it heals.

This generally proves a remedy for the gargil, when it is not of a very violent kind; and when it is, scarce any thing will be effectual. The addition of equal parts of gum elemi, and a few grains of euphorbium to the ointment, is then the best that can be done.



## C H A P. XXI.

*Of the garget.*

**T**HIS is a disorder of the outward parts of the head, attended with swelling and inflammation; which frequently spreads into the mouth, and sometimes into the throat, and down to the intestines. In this last case it is properly the murrain, though it begun with the garget. The garget is *the swelling of the head, eyes, and lips, extending itself to the gums and tongue, but no farther*: when it goes farther it acquires another name.

The most usual cause of the garget is *bad water*; but the extreme degree of it and of the murrain often arise from an infectious state of the air. When the farmer sees an ox or cow affected with a swelling in the head, discovering itself about the eyes, the first thing is to examine the lips; if they are swelled, he must look into the mouth and examine the tongue. If the eyes, lips, and whole outside of the head be effected, and nothing more, the remedy is as follows.

First let the creature be blooded very largely; and immediately after give the following mixture. Heat a quart of ale, and dissolve in it three quarters of an ounce of mithridate; add ten grains of saffron, and a tea spoonful of spirit of nitre: give this every six hours, and observe whether the swelling about the eyes decreases: this is the great symptom by which to know whether the medicine takes effect. Give the drink warm, and as much as the creature pleases.

If the swelling continues, especially if it encreases, bleed again more largely than before; and give three ounces of Glauber's salt dissolved in water. This will purge briskly; and by this change of the remedies there is a fair chance for a cure. If these methods fail at first, continue them interchangeably, till there is an amendment or death.

The next stage of this disease, is that in which the inside of the lips and the tongue are affected. This is still the garget, provided the outside of the head be affected also; but if otherwise it is the murrain, though in a less degree.

If the farmer first perceive the outside of the head swell, let him examine within the mouth, to know whether it have spread so far: and if he first perceive the disorder in the mouth, let him examine the head on the outside, to distinguish whether it be the garget, or the first stage of the murrain. We here suppose it the first of these cases; and that he finds the eyes starting, enflamed and swelled; the lips hot and swelled; and perhaps the under part of the neck: he will also perceive the



tongue very much disordered, This in the present case is a very essential point; for the tongue is usually the principal seat of the distemper.

Let the upper and under side of the tongue be searched carefully, and probably there will be found blisters on the top or sides; or a lodgment of matter under it; sometimes both. These blisters must be cut, and the point of a lancet or fine knife must be thrust into the sore or swelled part underneath: This done, the tongue is to be washed several times with sharp vinegar mixed with salt, and rubbed with a clean cloth: by this means the foul and offensive matter will be let out. Then the creature must be kept to the following course of medicines.

First let him be largely blooded. Then mix together a pint of ale, three quarters of an ounce of venice treacle, a quarter of an ounce of anniseeds in powder, and two spoonfuls of the juice of rue: this is all to be heated and given at a dose; and it must be repeated morning, noon, and night. Let the creature be kept warm, and let his drink be water, that has been poured boiling upon a good quantity of the herb agrimony, and let him have it warm.

## C H A P. XXII.

### *Of the murrain.*

**T**HE murrain is the highest degree of these distempers: what we call the distemper among the horned cattle at this time, is the murrain distinctly and properly so named. It is an inflammation of the whole passage through the body from the mouth to the farthest extremity of the guts; and it is attended with a very bad state of the blood. This disease sometimes arises from very unfavourable weather; the drinking bad water, and being reduced to feed upon coarse grass: but the general origin of it is in the air. Some cattle are, by the state of their blood and humours at that time, more exposed to receive the pestilential vapours than others; but all are exposed to it: and when it has once taken place, it spreads by absolute and plain contagion.

This is the cause of its being terribly destructive in some counties, and scarce appearing at all in others: and to this it is owing, that wherever it gets footing it spreads and continues.

There is no wonder that creatures standing near one another receive the contagion with the breath: especially as the temperature of the air favours the spreading. Upon this principle we see the wisdom of the legislature, in forbidding cattle from infected places to be brought into counties where the disease is not: and this gives the farmer the first hint of his proper conduct.



duct. As soon as he perceives this disorder upon any one of his cattle, let him separate that from the rest, and take care of all.

The first step is to bleed largely; and this should be extended to the sick and the well. In respect to the sick, it is the proper step to abate the inflammation; and as to the rest it may be sufficient to prevent the breaking out of the disease upon such as would otherwise have had it, from some slight infection communicated before the separation of the sick: or if it do break out upon them, they will have it more favourably.

The cattle separated by way of preservation need no farther care after bleeding; unless the disease appear upon any of them. In that case such are to be separated from the rest. As soon as they have been blooded, let a quantity of vinegar be made hot, and a little salt dissolved in it; and with that let their tongues, mouths, lips, and teeth be thoroughly washed.

Beat in a marble mortar half a dozen large heads of garlick: press out the juice, and add to it an equal quantity of tincture of myrrh. Set on half a pint of ale to be hot, and put to it a quarter of a pint of this mixture. When it is all hot together pour in two spoonfuls of tar, and then immediately give it to the creature. The tar will not mix with the rest, but it will go down with them. Let this be repeated once in four hours; and if there be no amendment the first day, let the creature be blooded again the day following, and the same course continued.

I have seen many other medicines tried, indeed almost innumerable; for of all herbs and drugs that the old woman and the doctor have ever recommended in pestilential distempers, not one has been omitted on this occasion. The disease is in itself so terrible, that it would be falsehood and folly to boast of vast success from any: but this we can assure the farmer, that of all the medicines that have come to our knowledge this has succeeded best.

Beside the value of this as a remedy, there is nothing so good as a preservative. For this reason, when some cattle of the farmers are taken ill, and are separated from the rest; and when, one after another, several of those set apart fall into it, the whole number of them should be preserved if possible from the same fate, by taking largely of this medicine. They should all have a dose night and morning for ten days after their separation from the sick.



## B O O K XIII. S E C T III.

*Of the diseases of S H E E P.*

## CHAP.

1. *Of a fever.*
2. *Of a purging.*
3. *Of the tag.*
4. *Of disorders of the lungs.*
5. *Of the jaundice.*
6. *Of stoppages in the throat.*
7. *Of sturdyness.*
8. *Of the wood evil.*

## CHAP.

9. *Of the staggers.*
10. *Of the scab.*
11. *Of the red-water.*
12. *Of the foot-worm.*
13. *Of the wild-fire.*
14. *Of disorders of the eyes.*
15. *Of the dropsy.*
16. *Of the rot.*

## The INTRODUCTION.

**T**HE disorders of sheep, though not so numerous as those of larger cattle, yet are such as it imports the farmer as well to understand; for they are as fatal, and some of them as difficult of cure.

## C H A P. I.

*Of the fever.*

**T**HE fever in sheep is an inflamed state of the blood, disordering the eyes and mouth, and affecting the whole body, though not so visibly. When the signs of a feverish disposition appear, the farmer must feel their feet; if they are hot, he may be sure he has guess'd right as to the distemper; this is a needful caution, because there are other disorders that will give an inflamed look to the eyes and mouth.

The disease is often destructive in itself; and frequently it brings on other fatal disorders. The cause is generally cold. When only two or three are affected by it, the case is less desperate; but when many together, it is always the more fatal.

The first thing is, to keep the sheep in a warmer and more sheltered place. In the heat of summer the weaker among the flock will be sometimes rendered feverish, only by being exposed too much to the sun: and in this case he must drive them to a cool shelter: in either condition they must be kept quiet, and must have wholesome sweet grass and fresh water. Then the following remedies will take place:

First bleed the sheep, and afterwards give to each the following medicine with a horn. Heat a quart of ale, and dissolve in it an ounce of mithridate; add half an ounce of Virginian ke-root, and one dram of cochineal in powder. This quantity



quantity serves for four doses, and one of them is to be given night and morning. If the sheep be bound in its body, an ounce of lenitive electuary is to be mixed with each dose; but if looser than ordinary, that is not to be regarded during the course of the remedies, for it will contribute to the cure. The four doses usually are sufficient.

C H A P. II.

*For a purging.*

**L**EAVE nature to her course when a purging comes on, with a fever, in sheep; but when the fever is abated, the purging must be stopp'd; and the same remedy that answers for this purpose, may be given for such purgings as come on of themselves.

Boil a quarter of a pound of raspings of logwood in two quarts of water, till but a quart is left; when it is near done, put in a stick of cinnamon: Strain it off, and give the sheep a quarter of a pint of it, with a horn, four times a day, till the purging ceases. If this does not stay the disorder, the following addition will render it sure of success. To every dose of this add a quarter of an ounce of diascordium without honey, and ten grains of Japan earth powdered; give the doses only morning and night.

C H A P. III.

*Of the tag.*

**T**HIS is an external disorder, owing to the complaint last named. It is a distemperature of the tail beginning with filth and foulness, and ending in ulceration.

The tag is situated in the inner part of the tail: it consists of scabs and sores, very painful and wasting to the creature; and is owing to the fouling of this part by a purging. That tag is worst which follows a fever, because the inflamed state of the blood tends to encrease the disorder; and when it begins, during the continuance of the disease, the matter of the fever may chance to settle there. Two things are to be done; the first is, to stop the purging; and the other, to clean the tail.

The last mentioned remedy, either in its weaker or stronger form, is to be used to stop the purging; and the tail being clipp'd, and the sore part laid bare, first wash it carefully with milk and water blood-warm, and then with lime-water. After this turn the sheep loose into a clean dry pasture. Two days after look at it again, and, if not well, repeat the washing, and anoint it with grease and tar mixed together. Twice doing of this is generally sufficient for the compleating of a cure.

CHAP.



## C H A P. IV.

*Of the disorders of the lungs.*

**S**HEEP are subject to be disordered in the lungs, which is easily perceived in their breathing or by their coughing: nothing requires a more speedy remedy; for they grow incurable when it is neglected but a little time; and die as men in a consumption. Change of air and pasture are essential to the cure; without this no remedies will take place: with it the following rarely fails.

This disorder is owing to cold; and it generally comes upon sheep that have been kept in low grounds in wet weather.

Drive them into an enclosed pasture where there is short grass and a gravelly soil; and where there is spring or other running water. Bruise a basket-full of the leaves of colt's-foot, and press out the juice. Bruise an equal quantity of plantain, leaves and roots together, and press out its juice. Mix these, and bruise as much garlick as will yield about a fourth part as much juice as one of the others. Mix all together, and add to them a pound of honey, an ounce of powdered aniseeds, and an ounce and half of powdered elecampane; give a quarter of a pint of this warm, to every sheep that is affected, once in a day, and it will by degrees make a perfect cure.

## C H A P. V.

*Of the jaundice.*

**S**HEEP are more subject than any animal to obstructions of the liver; and this is seen in a yellowness of the eyes, and a tinct of the same kind in the skin, when carefully examined. Our farmers, in some places, call this the choler; or, as they speak it, the colour.

Drive the sheep that are affected into an open pasture; and let the person who has the care of them, keep them often in motion, but not fatigue them; then prepare the following remedy. Boil in four gallons of water two pound of fennel roots, the same quantity of parsley roots, and twice as much roots of couch-grass, all cut small; when the water is very strong of them, and there is about half the quantity left, strain it off, pressing it hard. Bruise as much great celandine as will yield three pints of juice, add this to the liquor, and lastly put in three drams of salt of steel. Mix all together, and every day heat so much of it as will serve to give every one of the sheep that is ill a gill and half for a dose. This, with the forementioned directions, rarely fails of a cure.



C H A P. VI.

*Of stoppages in the throat.*

**S**HEEP affected with this, wheaze and breathe with difficulty. It commonly arises from bad pasturage and colds. The remedy is this: drive them into a higher ground and keep them warm; then give the following medicine. Bruise a good quantity of penny-royal, and squeeze out the juice. Put to a quart of this a pound of honey, and half a pint of sharp vinegar. Give the sheep half a pint of this, bloodwarm, every night.

Penny-royal is, by some, delivered as a remedy for all disorders of sheep; but this is erroneous: nothing has been hitherto so little understood as the medicines proper for cattle. What are here delivered, are, in general, supported by experience; and that physician who has judgment to propose more, and patience to see them try'd fairly; to approve and establish the best, alter and amend the others; and finally to publish the result of all, will deserve a statue, for the good done to his country, more than all her heroes.

C H A P. VII.

*Of sturdyness.*

**T**HIS is a giddiness in the head in sheep. It rises principally from very rich feeding. The cure is this.

Bleed the sheep largely, then give the following draught. Bruise some roots of wild valerian, squeeze out the juice, heat it, and give a quarter of a pint. Repeat this once in four hours. When the sheep is recovered, turn it upon the common, or into some barren hilly pasture; it will be kept from relapses by having but little food, and that perfectly wholesome. If this disease returns it is commonly fatal.

C H A P. VIII.

*Of the wood evil.*

**T**HIS disorder is a kind of cramp: it seizes the legs of sheep, and will often affect a whole flock at one. The cause is cold and wet. The lying under the drip of trees in rainy seasons has often occasioned it, and thence it got the name of the wood evil.

The first care is to remove the sheep into a dry pasture, and then proper remedies may take effect. Boil in a large quantity of ale as much common cinquefoil and hedge mustard as can well be stir'd into it. When the liquor is very strong, strain it off,



off, and add a pint of juice of valerian root to every gallon. Give the sheep half a pint of this, in a horn, morning and night. Boil in vinegar a large quantity of the leaves of hedge-mustard, and with this liquor, hot, rub the legs of the sheep.

## C H A P. IX.

*Of the staggers.*

**S**HEEP have this disorder as well as horses, and it arises from improper food. They crop the young shoots of shrubs; and though many of these are wholesome, some are hurtful. Eating the oak leaves and buds is particularly prejudicial; it binds them in the bowels, and frequently the staggers follow. The symptoms are like those of the sturdyness, but more violent; and there is generally a trembling, at the same time, in all the limbs.

Dissolve an ounce of assafoetida in two quarts of water. Give the sheep a quarter of a pint of this, warm, every three hours; it commonly opens their bowels at the same time that it takes immediate effect upon the nervous disorder, and thus performs a perfect cure. Some of our farmers put the assafoetida into the ears of the sheep; but that is an idle practice. Medicines are easily given them inwardly with a horn, and there is no other way in which any dependance can be placed upon them. When the sheep are recovered, let them be kept out of the way of a return to the same food, and they will be in no danger of a relapse.

The farmer will see by the several accounts of these most ordinary diseases incident to sheep, that they are not so subject to them as many other creatures, from unknown causes, but fall into them principally from a bad method of keeping. In general, low grounds are the most unwholesome; for they abound with wet, and give birth to many weeds of a poisonous nature not found in others. Woods also are disadvantageous on many accounts: therefore let him be careful of his feeding, and he will have less to fear on account of disorders in this kind; and when they so happen, they will be lighter and more easily remedy'd.

## C H A P. X.

*Of the scab.*

**T**HIS is a disorder to which sheep are very liable; but as many of the others, arise oftener from ill management than any natural cause, so this more than any. Sheep kept on downs, or in dry wholesome pastures, are very little liable to it;



it; those which lie wet, or get under droppings of trees in bad seasons, are frequently affected by it in the severest manner.

When the wet falls upon their skins, and they are heated afterwards; especially when they lie under trees, and the wet falls upon them from the branches, their skins grow scurfy, and in a little time there rise scabs in various parts; upon this the wool grows loose, and the sheep pine and become lean.

If it be a season for shearing, or if that can be done with propriety, nothing is so good a step to the cure: if not, the same remedies must be applied without: cleanliness is the great article; and it is in vain to begin a cure without it. They must be washed in the foul places with soap-suds, made very strong, and used warm with a flannel or brush. After this they must be turned loose into a clean pasture, and driven up again as soon as well dry'd, and all the sore parts must be well wetted with lime-water. The scurfy parts of the skin must be regarded; and the doing this three times, at two days distance each, will be a remedy.

If this fail, the parts that have been thus washed and cleaned, must be anointed with a mixture of equal parts of tar and grease, and they will soon be perfectly well. No inward medicines are required, for the complaint is only on the skin.

#### C H A P. XI.

##### *Of the red water.*

**F**ARMERS do not seem well to understand themselves in respect of this disorder; but in some places call an inward disease, and in others an outward one, by this name. The last is the proper meaning of the word. Though it appears outwardly it is not entirely of the external kind, as the former: the blood is always more or less affected with it, and care must be taken, by inward as well as outward medicines, in the cure.

The great mistake has been the attempting it by outward remedies alone. The appearance of the disorder is about the breast and belly, but it will spread itself to other parts. It is an inflammation of the skin that often raises it into blisters, and in those is contained a sharp humour, thin, watery, and coloured with blood. Nothing must be done to strike it in, but the cure regularly attempted by amending the bad state of the blood.

The sheep that are affected with it, must be separated, or otherwise it will be very apt to spread; and they must be put where there is sweet grass and good water.

Mix half an ounce of flour of brimstone with an ounce of honey; work it well together, and then divide it into two parts. Dissolve one of these in half a pint of juice of nettles, and give it



it every day for a fortnight. Slit the blisters when they are full of this watery humour, and having let the matter out, wet the place with juice of wormwood. After four days of this course, bleed them; and then continue the same method till they are well.

## C H A P. XII.

*Of the foot-worm.*

**S**HEEP are liable to breed worms between their feet; principally when they are kept in wet pastures. It is very painful to them, and will make them pine away. It is perceived by their frequent holding up one foot; and by their setting it tenderly down.

Let the foot be washed clean, particularly between the toes, and there will be seen a little lump like a tuft of hair. This is the head of the worm. It is to be taken out with care, for 'tis of a tender substance, and if it be broke in the foot it will occasion an inflammation. The best method is to open the flesh on each side of it, and then, by means of a pair of knippers, to take it out. Dress the wound with tar and grease melted together in equal quantities, and turn the sheep loose. It is better to put it into a fresh pasture; for if the same disorder returns, it is generally worse.

## C H A P. XIII.

*Of the wild-fire.*

**T**HIS is a violent inflammation, in the manner of a saint Anthony's fire, upon the skin of the sheep, in different places; and generally infects the whole flock. Our forefathers buried the sheep alive with its feet upwards at the door of the fold; and supposed this acted as a spell to drive away the disease. We do not inherit these errors. The method to be observed is this.

Such sheep as are infected are to be separated from the rest. Then bleed them, and prepare the following external remedy. Bruise the leaves of wild chervill, and add to them as much lime-water as will make the whole very soft. When it is beat up together, add as much powder of fenugreek-seed as will reduce it to pap; then put it into a pan, and set it in a cool place. Rub the inflamed part carefully with this every evening, and make as much lie on as can be kept there; it will take effect during the time of rest, and is to be repeated as long as there is occasion.



## C H A P. XIV.

*Of disorders of the eyes.*

**S**HEEP are often affected with colds falling upon their eyes, and almost blinding them; and, at other times, the same accidents arise without any visible cause. The remedy in either case is the same. Press out the juice of great celandine, and drop a quantity of it into the eyes night and morning.

## C H A P. XV.

*Of the dropsy.*

**S**HEEP are often swelled with water in their bellies; and this, if not regarded in time, is certain destruction. There are two ways in which it is lodged; the one is between the outward flesh and the rim; the other within the rim. In the first case, the cure is easy; in the other, nothing can be done.

The method, in the first case, is by a coarse kind of tapping. An opening is to be made in the flesh, and a quill thrust in; this will give the water a free passage out, and the wound heals of itself: but when the creature is emaciated, nature will not have strength to heal it: in that case, the sheep is to be examined daily, and the wound dressed with grease and tar. The creature must be put into a fresh, dry, and wholesome pasture, and then disposed of as soon as recruited; for this is a disorder that never fails to return upon any mismanagement in keeping.

## C H A P. XVI.

*Of the rot.*

**T**HE rot among sheep is the most destructive of all disorders. It is contagious, like the murrain. It usually spreads through the whole flock; and often over the neighbouring country. Preservation from it is of as much importance as its cure; indeed of more, because the cure is very uncertain. Sheep that feed at large upon open commons, are more subject to it than such as have shelter, and are taken care of at nights: those which feed in the dampest grounds, are most subject to it; and it frequently arises from a cold season and dribbling rains coming on soon after the shearing. Lastly, want of food will occasion the same disease; and the eating such grass as is full of unwholesome plants.

Such are the causes in many places; but the worst and most common is infection. Keep sheep out of the way of these causes of the rot; and the same care will preserve them from most other disorders: when the distemper is any where near him,



him, let the farmer be careful to keep them clear and distant from all others. Damp grounds are always dangerous ; and in wet seasons especially.

In such times, the best practice is quickly to remove the flock to the upland pastures, and to give them hay as a part of their food. 'Tis a happiness to discover the disease in time. The first notice of it will be perceived in the eyes ; and therefore in a wet season, and especially at a time when the rot is among the neighbouring sheep, let him look into that part. When a sheep is infected, the white of the eyes looks dull, and they have a faint aspect ; the creature is feeble, and his skin is foul : the wool comes off in handfuls with the least touch ; and the gums look pale and the teeth foul. He will be dull and listless in motion ; and heavy, as if his legs were not able to carry him.

Many are generally infected at a time, and the first care must be to remove them from among the sound ones : and put them up in a close fold. They must have little water ; and their food must be dry hay and oats. The best way of giving these, is in troughs placed round the fold.

Bleeding is destructive in the rot.

Sheep fed in salt marshes never have the rot. This put it into people's thoughts to try salt as a cure ; and we read wonders of its effects. I have seen it tryed, and sometimes with good consequences ; but never with the great success that is boasted. Salt is a preservative against the rot ; but it is not so certain a cure.

The best is bay salt ; and the best way of giving it, is by beating it to powder, and then sprinkling it among the dry food. Though we do not advise the farmer to rely upon it entirely, we shall recommend it among other remedies.

Bruise an ounce of grains of paradise, and four ounces of juniper-berries dry'd ; add to these two pounds of bay-salt and half a pound of loaf sugar, grind them all well together, and sprinkle some of this upon the hay and the oats that are given the sheep. Let this be continued three days, and look from time to time into the eyes, and examine every other way, to see whether they mend or grow worse. If there be signs of amendment, let the same course be continued : if not, the following must be used. Steep four pounds of antimony in two gallons of ale, for a week ; then give the sheep this every night and morning, a quarter of a pint at a time.

Boil a pound of the roots of avens, and two pounds of the root of master-wort, in two gallons of water, till there is not more than six quarts remaining : strain this off, and press it hard ;  
then



then pour a pint of it into a pail-full of water that is to be given to the sheep for their drink.

By these means, carefully managed, and under a good regulation in cleanness, dryness, and warmth, the rot will be often cured: this is all that can be promised; for there are times when the disease is so rooted, and when the temperature of the air so favours it, that nothing will get the better of its violence. If the sheep have a distaste to their food, because of the salt and other ingredients mixed among it, they must be omitted for two or three feedings; and then given in less quantities.

B O O K XIII. S E C T. IV.

*Of the disorders of H O G S.*

CHAP.

1. *Of the fever.*
2. *Of the murrain.*
3. *Of the jaundice.*
4. *Of sickness at the stomach.*
5. *Of the measles.*
6. *Of the lethargy.*
7. *Of the swelling of the milt.*

CHAP.

8. *Of a purging.*
9. *Of imposthumations and boils.*
10. *Of foulness of the skin.*
11. *Of sore ears.*
12. *Of the pox.*

The INTRODUCTION.

**T**HE hog is not without its disorders, though they are not so many as those which attend sheep. We shall not leave the farmer uninstructed in any thing that concerns his interest; wherefore we name them here, and shall deliver the symptoms by which they are known; and the approved remedies.

CHAP. I.

*Of a fever.*

**A** Fever is common among cattle of most kinds; and the hog is not exempt from it. The first symptom of it is his forsaking his food. The hog has a ravenous appetite from nature, and when he loses it something is much amiss. He will soon after droop and grow faint, and if not taken care of will pine in his flesh, and the disorder will end in his destruction.

The first step is bleeding, and the best place is behind the ears. If this part do not bleed freely, his tail is to be cut; and between one and the other there will be got enough. A pint is a proper quantity.



After bleeding put him up warm, and give him a good hot mess made of raspings of bread, broth, and some chopped penny-royal. As soon as he has well tasted this take it away. This will make him ravenous, and he will swallow it with the addition of a medicine, which he would not have done before. This must be philonium romanum. Half an ounce of it must be put into a gallon of the mess, and he must eat a little at a time. If he take above half he will have an over dose: therefore it must be taken away; and eight hours he must be kept without any thing else. This will make him ready to take the remainder; and that probably will make a perfect cure.

## C H A P. II.

*Of the murrain.*

**T**HIS is as fatal to hogs, as other creatures. It is owing to bad food; and discovers itself by the wateriness of the eyes, and by the hanging of the head to one side: the creature also is weak, faint, and refuses its victuals.

Make a very good warm mash; and let the hogs be kept all the afternoon and all the night fasting before it is set before them. Put into it half a pound of grey ground liver-wort, and the bigness of an egg of red oaker, with as much salt-petre as will lie upon a shilling, powdered. The hog will generally be tempted to eat some of this after so much fasting. When he leaves off, if he have swallowed ever so little, take it away.

Four or five hours after set it before him again, and he will eat more; and by this means he will be brought to his stomach. All his food must have a little salt-petre and a good quantity of liver-wort in it. This will take effect, if he be within the reach of remedy: but it is a disease that is very often fatal. Cleanliness and good management must assist, or no medicines will do.

## C H A P. III.

*Of the jaundice.*

**T**HE hog is subject to an overflowing of the gall, which shews itself by a yellowness of the eyes and about the lips, and by a swelling under the jaws. Bruise great celandine, and press out the juice; add to it one fourth part the quantity of vinegar. Bruise a good quantity of wood-lice, and when all is ready make a hot mash: into as much of this as the hog will eat at a time, put a pint of the juice and vinegar, and about a quarter of a pound of the bruised wood-lice.

Let him fast three hours before he has this, and six hours after



after it. He will like the mash the better for these ingredients.

If his stomach be so bad that he will not eat it all at once, it must be taken from him as soon as he shews a distaste, and set before him again half an hour after. A hog will thus be led to eat almost under any sickness: and this is the true method of curing his disorders.

CHAP. IV.

*For sickness at the stomach.*

**T**HE hog, though his stomach is naturally very strong, is subject to sickness, and will cast up his food. This will encrease upon him, and he will waste away. The cure is by a change in his food; or if it be necessary the addition of a medicine with it: but the first usually answers.

Keep him from all coarse meats, and give him beans with a little water. If this answer alone, it is better than giving medicines: if it do not, give him every day among his food half an ounce of mithridate. It will at the same time warm and strengthen his stomach; and he must be kept to good food for fear of a relapse.

CHAP. V.

*Of the measles.*

**T**HIS is a common disorder among hogs, and shews itself in a redness of the eyes, and foulness of the skin, and in their neglecting their food.

Keep the hog fasting the whole afternoon and night. Then set before him a good mess of victuals; not large in quantity, but hot and well prepared, and put into it forty grains of salt of hartshorn and two ounces of bole armenick. It will all go down very well after this fast: the same method is to be followed every day till he is perfectly recovered, and for a few days after, for fear of returns.

CHAP. VI.

*Of the lethargy.*

**T**HE hog will sometimes fall into the sleeping-evil or lethargy. He will doze all day long, neglect his food, and pine away. The remedy is a vomit; and the best is this.

Gather a good quantity of wall pepper, bruise this in a marble mortar, and press out the juice. Keep the creature fasting all the afternoon and night, and in the morning set before him a warm mess, into which put a pint of the juice of the stone crop. He will be tempted to eat by his long fast; and the hog is not very curious about tastes. He will vomit soon af-



ter he has swallowed it; and that single dose will frequently prove a cure. If this be not sufficient it must be repeated next day.

## C H A P. VII.

*Of the swelling of the milt.*

**W**HEN a hog is giddy, and runs principally on one side, the farmer is to understand that it is his milt that is disordered; and if he be not relieved he will forsake his food, and pine to death. The usual cause of the disorder is a surfeit in feeding upon mast.

The cure is this. Bruise a good quantity of the leaves and tops of common wormwood, and press out the juice: add to this some juice of penny-royal, and give the hog a pint of it in every mess of his victuals till he is perfectly recovered; which will be known by the steadiness of his walk and his quietness.

## C H A P. VIII.

*For a purging.*

**H**OGS that are taken with a flux often have it to a great violence, and waste with it till they are only skin and bone. It rises from bad food. The cure is this. Make a good mess of food for him, and put into it half a pound of a-corn husks. Observe whether he grow better. If he do, repeat the same method till he is perfectly cured.

If this do not succeed, give him in every mess of his food a handful of tormentill roots chopped small. This scarce ever fails of compleating the cure.

## C H A P. IX.

*Of imposthumes or boils.*

**H**OGS are subject to boils and hard swellings in various parts; and the best method is to open them, and let out the matter at a proper time. A common knife answers this purpose. The farmer must watch for their growing soft, that being the mark that they are in a condition to be cut. He is then to lay the boil open the whole length, and press it on the sides to get out the matter; and when this is done he must anoint the place with grease and tar, and it will heal presently.

## C H A P. X.

*Of foulness of the skin.*

**T**HE hog is naturally uncleanly, and the farmer must take the more care in his management. A wet stye will sub-  
ject



ject him to colds and fevers: but if it be wet and nasty together, the first consequence will be a foulness, scurf, and scabbiness of the skin. The hog will pine, and all his meat will be thrown away upon him, unless this be cured. The blood is often in fault in these foulnesses, and then inward remedies are needful: the others may be tried first, and if they do not take effect, that is a proof these are wanted.

First bleed the hog under the tail, as much as can be well got away: it ought to be a pint at least. Then prepare some very strong soap suds. Rub common soft soap upon a scrubbing brush, dip it in the suds, and scrub the hog well all over. After this wash him well with warm lime water, and make the stye clean; give him dry litter and wholesome food, and after two days clean him again, and rub him with lime water.

If this do not make a cure his blood is infected; and flower of brimstone must be put into his victuals in large quantities. This, with the repetition of the other will cure. If the skin be broken in any place it must be dressed with tar and grease; and when he takes the brimstone inwardly, some should also be mixed in ointment.

#### CHAP. XI.

*For sore ears.*

SOMETIMES the hog will have a soreness about the ears from dirt and filth: more frequently it rises from the teeth of dogs; and the worst is when both causes come together. The dogs make the hurts; and the dirt occasions them to fester.

Warm some vinegar, and wash the ears thoroughly till they are clean; then make an ointment of tar and grease in equal quantities, and add a little common soap. Rub the sore parts with this, and repeat it till the cure is perfected.

#### CHAP. XII.

*Of the pox.*

THIS is a disorder that shews itself outwardly in pimples and blotches; keeps the creatures miserable, and makes them pine and waste. It rises from wet and filth in their styes, and from unwholesome food.

Make a hot mess, and give in it an ounce of venice treacle. After this let the whole skin be cleaned with soap suds, and wherever the sores and pimples are, use the following ointment. Melt two pounds of hog's lard, and stir in half a pint of tar. When it is taken off the fire, put to it as much flower of brimstone as will thicken it when cold into a firm ointment. Rub



this upon the hog every night for four times, and keep him dry and clean : it will commonly make a cure in that time.

This disease is infectious. The farmer must separate those which have it from the rest, and not put them together again till they have been some time well, and he sees there is no return of the disorder.

## B O O K XIII. S E C T V.

### *Of the disorders of P O U L T R Y.*

#### CHAP.

1. *Of the pip.*
2. *Of the roup.*
3. *Of the flux.*
4. *Of stoppage of stools.*

#### CHAP.

5. *Of sore eyes.*
6. *Of vermin upon poultry.*
7. *Of sores.*

### The I N T R O D U C T I O N.

**T**H E S E animals have their disorders like others ; and their remedies are as efficacious and certain. The farmer will the easier be a master of this part of his care, because there is not so great difference between one kind of poultry and another, that there is between one kind and another of the four-footed animals. Their distempers are the same in general, and the same remedies will cure them.

#### C H A P. I.

##### *Of the pip.*

**T**H I S is peculiar to young fowls, and arises from want of water. The natural moisture of the mouth hardens upon the end of the tongue into a kind of scale, and this prevents their feeding. The great care is to observe in time which have the disease, for the remedy is easy.

Let some bay salt be melted in a little vinegar and set in a faucer. Let the young creatures be taken up and the scale loosened, and then pulled off from the tongue with the fingers. Then wet the end of the tongue two or three times over with the vinegar and salt, and turn the chick loose where he cannot drink for an hour.

#### C H A P. II.

##### *Of the roup.*

**T**H I S is a small swelling of an inflamed kind upon the rump. The fowls that have it grow sickly ; their feathers stand rough, and they pine. When they are seen in this condition, let the farmer seek for the swelling and open it with a knife.



knife. Let him squeeze out the matter, and then wash the part with hot vinegar and turn the fowl loose.

C H A P. III.

*Of the flux.*

**N**O kind of poultry can thrive, unless they are properly in order with respect to their excrements; and wrong food will throw them into disorders in either extream. This of the flux is always occasioned by their eating too great a quantity of moist food. The best remedy is to give them such victuals for some days as tends to the other extream: and if this fails, to have recourse to more powerful things. Bran scalded is a food they will eat very freely; and it will commonly very well answer the purpose. If this does not set them right in two days, rub to powder some dry roots of tormentil and mix with it: this never fails; and they presently grow well and hearty.

C H A P. IV.

*Of stoppage of the stools.*

**T**HIS is the contrary extream, and is owing to eating too much dry and binding meat. It renders their excrements hard, and prevents their voiding them freely.

The first attempt to a remedy should be by the food; and if that fail medicines must be added. Those cures performed by a change of diet are always more natural and more lasting. Give them bread soaked in broth; and if that fails, add to the mess a small quantity of manna: skim off the fattest part of some liquor in which meat has been boiled, dissolve in half a pint of this two ounces of ordinary manna, and then put in some bread to soak. They will eat this very freely, and it will certainly cure them.

C H A P. V.

*Of sore eyes.*

**T**HIS complaint is common among poultry, and it is easily remedied. Their eyes are often hurt by accident in their going among briars, and by their pecking one another; and they are also subject to swell and inflame with colds. These disorders shew themselves in various parts of the eyes and eye-lids; but one remedy serves for them all.

Gather equal quantities of celandine, ground ivy, and clown's wound-wort. Bruise them in a marble mortar, and press out the juice. Add to half a pint of this four spoonfuls of white wine, and dipping a pencil-brush in it, rub the eye-lids and eyes carefully every morning and evening.



## C H A P. VI.

*Of vermin upon poultry.*

**W**HEN fowls are kept in a yard they have not always opportunities of cleanliness, and whenever it is omitted they suffer. Their feathers keep their skin so warm, that it is a natural place for the breeding of vermin; and, every kind of fowl, as well as every species of beast, the eagle and the lion not excepted, have their louse, which will be sure to appear when uncleanness encourages it. The means of cleanness are plenty of water and dry ground; the fowls will wash themselves in the one, and rub themselves in the other; and thus keeping clean they are free from vermin: but when they have foul water it sticks to their skins, and gives filth instead of cleaning it away.

To prevent this evil, let the farmer take care there be good water; and a dry soil in some part of the yard. When it is come on the remedy is this. Boil a quarter of a pound of white hellebore root sliced in two quarts of water to a pint and a half. Strain this off, put it into a quart bottle, and put to it an ounce of beaten pepper, and half an ounce of Scotch snuff. Wash the skin where the vermin are with this, and it will prove a certain and speedy cure. But if they be not thoroughly killed they will soon breed again.

## C H A P. VII.

*For sores.*

**S**ORES and swellings will appear upon fowls in different parts of the body, and they never fail to make the creatures pine. When poultry droop, and their feathers hang rough, let the owner examine them, he will usually find some such disorder. The cause is bad food, or bad water, and ill keeping.

Melt together in a pipkin equal quantities of resin, butter and tar. Bathe the sore first with warm milk and water, and then dress it with this ointment. Two or three dressings usually make a cure; but they must be kept more carefully to prevent a return.

End of the THIRTEENTH BOOK.

A C O M-



A

# COMPLEAT BODY OF HUSBANDRY.

## BOOK XIV.

*Of the distemperatures of trees, roots, and herbage, from  
the injuries done by insects, larger animals, and weeds.*

### IN THREE SECTIONS.

#### SECT. I. Of INSECTS.

##### CHAP.

1. *Of ants.*
2. *Of beetles.*
3. *Of worms.*
4. *Of slugs.*
5. *Of grasshoppers.*

##### CHAP.

6. *Of the locust.*
7. *Of caterpillars.*
8. *Of the grub.*
9. *Of flies.*

## INTRODUCTION.

**W**E have laid before the farmer the several accidents to which his crops and cattle are liable, from the seasons and other natural causes; and it remains that we treat of those distemperatures which are owing to the hurts of insects. These, by their number, are able to do great damage. This will be best guarded against by those who most thoroughly understand their nature. We shall treat of them severally, and explain their natures and qualities; the accidents, so far as they can be discovered, which cause their abounding at certain times; and the method by which trees, roots, and herbage, may be preserved from them: founding all in this part, as the preceding, on experience.

##### CHAP.



## C H A P. I.

*Of the ant.*

**T**HIS little creature is a troublesome enemy to the farmer in many articles, and must be destroyed in some cases, and guarded against in others with the utmost caution.

In pasture ground it raises hills, which we have already shewn the methods of cutting up; and in plowed lands it will eat the seed before it sprouts. Birds devour much of it, but they wait to see the shoot; these little enemies, whose number enables them to do vast mischief, by what they destroy, and partly what they carry away, follow it into the ground, and are themselves unseen, as well as the havock they make, till the farmer finds the misfortune in his poor shoot.

Ants are great breeders; and they are distinguished according to their sexes: the males have wings, the females none. There are several kinds of them, the largest living in woods; but these do little mischief. The small common ant is the kind hurtful to the farmer. Their eggs are small and round; what is called the ant's egg, is a thin case, in which the female lies while the wings are forming. All insects that have wings lie in a still state some time; the silk-worm, the caterpillar, the bee, and all others. This called the egg is the same state of the ants; and as they are utterly unable to move, during that condition, the rest take care of them, carrying them to places of safety.

The mischief they do trees is by eating off the young buds; but this is only of a few particular kinds. Some fruits also they are fond of, as is seen in gardens. In grass-grounds they do no harm but by those hills, which are troublesome enough. In new-sown corn-fields they are most destructive, creeping in at the chinks of the ground, and spoiling more than they devour or carry away. Wheat is most subject to their depredations; and the smallest wheat the most: as its skin is thinnest, and it is easiest of carriage. Barley they will attack, especially that which is best, waiting till it is somewhat softened in the ground.

The other kinds that suffer most, are hemp, flax, and cole-feed. Rye they are not very fond of; and all kinds of pulse are safe, for they do not like them; the skins are too thick, and the meal is too bitter.

The remedy is destroying them; and this is done several ways. Let the farmer find their nests, which are under hedges, about the stumps of old trees, and on little risings of ground. Let him carry wet straw to these places, cover all the nests, and  
fire



fire it. The smoak will destroy them. If once going over the ground do not answer the purpose, it must be repeated.

The time for doing this is half an hour after sun-set, for they are then all together. They hate lime-foot and ashes; these are all good manures, and should be used where ants are most likely to come. 'Tis also a good method to dress the land with these after they have been choaked with burning the litter. This perfects the destruction of them, and they are seldom found to infest such a piece of ground afterwards.

## CHAP. II.

### *Of beetles.*

**T**HE kinds of beetles are innumerable: we have them from the stag-horned; which is nearly as big as a wren, to the small black beetle of the rose-bush, which is scarce large enough to be visible. Many of them are great devourers. The farmer is aware of them in their winged state; but there is another condition in which they do him greater damage.

In the end of summer they lay their eggs just under the surface of the ground. These hatch into thick white maggots with six legs, and after a time of rest they come out with wings, in the proper form of a beetle. In the maggot or grub state, they eat the roots of grass and corn: eight years since they almost caused a famine in Norfolk.

In the beetle state they prey upon corn in the same manner as ants. They creep into the cracks of the ground, and devour the best grains. Their time of mischief is when the grain is swelled, and before it shoots. They are more universal destroyers than the ants, for they have stronger jaws, and less nicety in their taste. There is no kind of grain or pulse secure against them.

The method of destroying them is this. Just before the sowing, carry some wet litter into the field: lay it in heaps, and about evening set fire to it. That fuel is best which makes most and thickest smoak. They lie concealed in bushes and hedges, but they fly at evening: this is therefore the time to destroy them or drive them away. They are afraid of smoak as much as ants: they will be choaked in great numbers by it; and what escape destruction will get far off. The same manures that are useful against the ant, are serviceable against the beetle: and it is a good method, where they are very plentiful, or a field is particularly in danger, to scatter lime over it just after sowing.



## C H A P. III.

*Of worms.*

**G**ardeners imagine worms do them no harm ; but those who have observed the field, can tell them they mistake. There is a particular time at which they feed upon the grain ; and they are so numerous, that the destruction is very great.

There are three principal kinds of worms, the great and small red worm, and the olive colour'd. The small red worms are the most destructive. They are too common in good lands naturally : and multitudes are brought on with the dung. The time when they destroy corn is just when it has swelled, and is beginning to shoot.

A good method of destroying them, is to drive a number of nails half way in upon the lower part of the plough which goes into the ground. These tear the worms to pieces in great numbers ; and they are also very useful in breaking the ground more fine.

Another way is, to make fires of wet litter on different parts of the land. This destroys many of the small worms that are nearest the surface, and they are what do the mischief.

The greatest remedy is steeping the seed-corn in a proper brine. The taste of copperas is hateful to worms ; and they are no way better guarded against than this.

It is supposed hemp is destructive of them, but this is an error. The best preservative is to sprinkle lye over the seed-corn after steeping, and then to sift lime over it, and sow it, well covered, with both.

## C H A P. IV.

*Of slugs.*

**W**E have named the destroyers of crops in the ground ; and are next to consider the devourers of them when they have sprouted : of these none is so fatal, so numerous, or so hard to be conquered, as the slug. The slug, or naked snail, is of two kinds, a large black and a small brown one. The black is the greatest devourer ; but the other is more apt to escape, being small and of the colour of the ground.

In gardens these eat the hearts of new-planted herbs ; but in fields they get a little within the surface, and eat the first shoots of the crop. The stalk, which is to support the ear, together with the rudiment of the ear, lie in this first shoot, and are eaten off by these creatures.



The small brown slug is most destructive of wheat and other grain; the great black slug of pulse. They are most frequent on land manured with dung; and fewest of all are found where the sharpest manures are used, such as lime.

Two things are found most disagreeable to them; lime and foot. The farmer knows the time when they will come to be mischievous. Let him have some fresh and strong lime ready; and about eight days after the sowing of the corn, let one or more of his chimneys be swept for foot. Let him mix together equal quantities of the fresh foot and lime, and sprinkle it over the ground. This will greatly promote the strength of the crop, and at the same time poison multitudes of these vermin.

If he has the advantage of a shower about this time, let him by all means order the foot and lime to be thrown on soon afterwards: if not, the best time is early in the morning; because they are then out, and upon the surface of the ground. In small pieces of ground, a mixture of soap-lees and tallow-chandlers greaves, destroys them utterly.

#### C H A P. V.

##### *Of grasshoppers.*

**T**HESE feed upon the shoot as soon as it appears, and are very mischievous to summer corn, and other late sown crops. They eat those down so very deep, that frequently there is never another shoot made, but the grain dies. The remedy is of a peculiar kind. They cannot endure the taste of bitters of any sort. The farmers, who have a tradition of this kind, boil wormwood in water, and sprinkle it over those crops which the grasshopper is devouring. But there is a much more powerful remedy. Coloquintida is the most hateful bitter in the world; and a very small quantity of it will give its taste to a vast deal of water. This should be sprinkled on the crop, and will never fail.

#### C H A P. VI.

##### *Of the locust.*

**T**HIS terrible destroyer we are little acquainted with in Britain. We were threatened with a swarm of them some few years since; and, as it is possible, they may come at some other time, it may not be amiss thus shortly to mention them.

They devour the green crop of any kind, and in any degree of growth; and when they come in such swarms as to cover the whole ground to a great depth, there can be no remedy. If they should ever threaten our crops, it would naturally be in a less quantity;



quantity ; and the preservation would be in the method just directed. Coloquintida should be boiled in water, and the liquor sprinkled over the field. It is a taste so extremely nauseous, that probably no creature would eat any thing wetted with it.

## C H A P. VII.

*Of the caterpillar.*

**C**aterpillars are of many kinds. They are the young of the butterfly species, and are various in their form, size and colours. The butterfly lays her eggs upon some plant ; and there the caterpillars are hatched. This plant is their food, the farmers crops suffer because they are well tasted : and the creature does vast mischief.

The pulse kind are most subject to them ; and it is essential to guard against them. In trees their nests should be sought, after the leaves are fallen ; for many of them breed in great numbers, the eggs remaining in the nest all winter, and hatching just when the leaves come out in spring. These nests are generally at the extremities of the branches.

When the farmer sees them or perceives by their havock they are numerous, his remedy is this : melt some pitch in an earthen pipkin, and put to it some flour of brimstone. Let it cool, and divide it into several lumps. Place small heaps of straw in different parts of the field, and on each lay one of these lumps. Set fire to the straw, and the other ingredients will melt and burn among it ; and every caterpillar that is within the influence of the smoak will perish. If once be not sufficient, this may be repeated.

In small plantations use the following method. Boil some tobacco in urine, and add to it some soap-lees. Sprinkle where the caterpillars are, and it will destroy them.

## C H A P. VIII.

*Of the grub.*

**T**HE grub is the worm produced by the eggs of the beetle. There is one particular kind more destructive than the rest ; and when the grub is mentioned without any distinction, this kind is meant. It is a thick, short, whitish worm, with a hard red head, and six short legs. It is found among the roots of corn, and does prodigious mischief. It feeds on the sweet matter of the corn, which is at that time a kind of pap, like cream ; and leaves the shoot to wither, and the body of the seed to decay.



cay. This creature is the produce of the cock-chafer, which is abundant in hedges in summer evenings.

It is an endless task to destroy the grub, because it lies under the ground; but there is no difficulty in preventing the danger, by destroying the old ones, to whose eggs the next brood must be owing. We have directed the farmer to defend against beetles in general, by making a great quantity of stinking and smothering smoke; and the same method is to be practised in this case. He is to burn wet stubble under all his hedges; and he will by this means either destroy or drive them from his ground.

## CHAP. IX.

### *Of flies.*

THESE are as innumerable in their kinds, as beetles or caterpillars, and no insect is more destructive of the farmer's crops. We have spoke of the damages they do to turnips, and other young shoots of useful plants; and shall refer the reader to their proper place for these considerations; but shall here give a general account of this destructive creature.

Among flies those which are the most conspicuous are the least hurtful. The smallest kinds are in the highest degree mischievous. The dragon fly, called the horse stinger, has no hurt in its disposition: a harmless insect, formed to wanton in the fields of air, to amuse us with its beauty, and the rapidity of its flight; and to do nothing to injure us.

It is much the same with the rest of the large kinds of fly: but it is otherwise with the small sorts. They herd together, settle upon the boughs of useful trees or plants, and destroy and pervert the course of nature by their sucking. Wherever these appear, the method for destroying them is by proper smoaks: there are ingredients to be used in this manner, which spread their effects so far, and operate so powerfully, that it is scarce possible for to escape them.

The smoak of brimstone is most efficacious to this purpose: there is a suffocating steam attends it no creature can endure. This is proper when it can be used conveniently, but it does not spread its effects far. A few matches burnt under a place where are a small parcel of these vermin, will stifle them all, but there is no spreading the influence of it over a whole field.

Orpiment is, of all known substances, the most extended in its influence; and happily for the farmer, the smoak of this is offensive beyond all other things. A dram of this will make as much smother as a vast quantity of straw; and the smell is like that of garlic, only more offensive.

This



This is the farmer's best safeguard against the fly which seizes innumeraibly upon many of his crops. He need not be afraid to use it, from its having been called a poisonous substance; for that is an error; it is a common thing to call yellow ratsbane by this name, but that is a thing altogether different. Yellow ratsbane is made by art; but the right orpiment is found natural in the earth: and the farmer's great care must be to purchase it of an honest person, and to explain what he does, and what he does not mean.

Let the farmer who has crops over-spread with flies, take a day when there is a little wind; and place himself so that it may convey the smoak he shall make directly upon his crop. Then let him light a few pieces of charcoal, and set over these a fire shovel with an ounce of orpiment beat to powder. There will presently rise from it a thick white smoak. The wind will drive it from him; but it will spread over a vast space of ground: if the field be small, once burning will do; if larger, it may be repeated in two or three places.

## BOOK XIV. SECT. II.

### *Of damages from larger animals.*

#### CHAP.

1. *Of mice.*
2. *Of moles.*

#### CHAP.

3. *Of birds.*

#### CHAP. I.

##### *Of mice.*

**T**H E R E are several species of field mice; but they are all equally the farmer's enemies: all feeding upon his seed-corn and pulse; and are all to be destroyed by the same means. Drier lands are more subject to these than wet; and sowing under furrow most exposes the seed to them.

The furrows will fall somewhat hollow, and they afford a shelter to the mice at the time of their committing their havock; for the corn lies perfectly exposed to them, and they are not exposed to his eye while they are feeding upon it.

In these lands I have traced the path of those devourers, and seen all eaten up, or carried away to some little distance; for under the covert of this tillage they will make their nests and granaries as it were in different places; and the seed shall be found stored up in one of these, that should have covered a  
great



great space of ground with its shoot. Though this manner of sowing gives the mice an advantage, the other way does not sufficiently secure the corn from them. When it is sown in the usual way and harrowed in, it is better covered; and there is a great deal more trouble for them to get at it: but they are very industrious, and will dig after it, and tear up and destroy a great deal.

When it is sown under furrow they begin with it as soon as it is in the ground; but when it is harrowed in they wait for its first sprout. This gives the farmer an advantage, because he knows when he is to expect them. He is not in this case to wait till he sees the shoot of his seed; for the mice have quick eyes, and will perceive it a day or two before he does: he is to look to his ground a day or two before the time of its being covered; and then, as he knows the devourers will be about, he is to prepare for their destruction. Traps are a poor method. There is no way worth his consideration but poison; and there are drugs which will answer this purpose, which are not poison to ourselves. It would be a disagreeable thing to be meddling with ratsbane; but there is no harm in handling the ingredients he has to use.

Mix up a peck of barley meal, a pound of powder of white hellebore root, and four ounces of powder of staves-acre; sifting them through a hair sieve, then add half a pound of honey, and as much milk as will work the whole into a paste. Let this be broke into pieces, and scattered over the field. They will eat it greedily, and it is certain death to them.

This is the method just at the time of danger; but the farmer who is pestered with these vermin, should think at other times of destroying them. They live at a small depth, and there breed in abundance. The passage into their nest is by a little round hole, easily seen in dry weather. The farmer should go his rounds with a quantity of the paste before directed; and wherever he sees a hole throw in a piece. A little trouble taken from time to time in the heat of summer when the holes are most conspicuous, would utterly destroy them.

## CHAP. II.

### *Of moles.*

THESE are enemies of another kind; but do as much mischief. We see their hills in pastures. But the damage they do to corn is greater; and frequently comes upon the farmer unexpectedly. He knows that ants and mice will eat the grain when newly sowed, and slugs destroy it when just shot



up ; but when these times are over he is at rest : on the contrary, there is no time at which the mole may not destroy his crop. This creature is fond of the roots of corn ; and beside the quantity they destroy by eating, they damage a vast deal more by undermining the ground. 'Tis hardly to be conceived what havock a single mole will make in a field of corn ; or in how little time : one of these creatures will burrow through a third part of an acre in a day ; and this perhaps at a time when the corn is half grown. The driest lands are most subject to these animals, but they will get into any ; and there is no creature against which it is so difficult to guard. There is no foreseeing when they will come ; but it is very important to know of their being in the ground as soon as possible.

The caution is to observe whether there be any there at the time of plowing. If there be, he is to use every method of destroying them : if not, he is to examine whether the lands nearest his own every way be infested by them, or clear from them. The freer they are the more likely he is to be clear of them ; but there is no certainty : there are times when they will come without any possible guess from whence ; and they will sometimes have done irreparable mischief, before 'tis discovered they are in the place. They are a defenceless creature, and not cunning. Their only security is the being hid ; and they betray themselves by the manner of their working.

The husbandman is to look for the tracks where they have gone ; he will easily know them by the different colour of the new turned up earth. He is to follow the course of one of these passages, and to dig cross holes in it, and watch the going out or coming back of the mole. Wherever it is casting, he is to strike it through with an iron instrument made for that purpose. The traps for them are also common, cheap, and of a plain structure. In some places the farmers content themselves with driving them out of the fields : this is to be done by smoaking them, as other creatures of a lesser kind are destroyed. They open their passages in several places, and burn heaps of straw and some brimstone. This will drive the moles out of a corn field : but it is not a safe or eligible method. It is only sending them out of ones own ground into a neighbours, who may in the same manner drive them back again. This is only a temporary relief ; and there is none effectual but their destruction.



## C H A P. III.

*Of birds.*

**T**H E S E are as hurtful as reptiles or insects, and must be guarded against by other means. Corn is open to a vast variety of birds, larger and smaller, and they are continually seeking after it. Small birds follow the sower, and from that time they are daily seeking after all that does not lie too deep for them; and they will in spite of the best care eat a great deal.

When the grain is about to shoot, the rook comes in. He perceives the first spire that gets above the surface, and tears up a great deal. There is no seed that is not food for these devourers. They fall upon all alike. The best defence against these devourers is the new method of husbandry.

Drill sowing gives security to seed, and limits the time of the danger of its being devoured, so that it is much more easy to protect it. There is nothing of that loss of the seed as thrown from the hand; nor can these rapacious creatures pick it up day by day afterwards as it lies exposed; 'tis covered by that practice, and the sole danger is just when it begins to peep above ground. If a boy or two be employed at that time to fright the birds away, it is naturally secure at all others.

About a fortnight after sowing of barley and other summer corn, and about six and twenty days after sowing wheat, rye, and the like, in autumn, let a couple of boys with pistols be sent into the field. Guns are unmanageable for such persons, and killing is not so much the purpose as the frightening. Any servant of the farmer's may with a gun kill a crow or two, or half a dozen sparrows, and they may be stuck up in the field. The boys need only fire powder, and they will thus weary and fright the birds away.

Morning and evening are the time of birds feeding. The boys must be sent into the field an hour before sun-rise, and must stay half an hour after sun-set; and these are the times when they must be most vigilant.



## BOOK XIV. SECT. IV.

*Of the damage from WEEDS.*

CHAP.

1. *Of the nature of weeds.*2. *Of the several kinds of weeds.*

CHAP.

3. *Of clearing the ground of weeds.*

## CHAP. I.

*Of the nature of weeds.*

**W**HEN the farmer has been at the charge of enriching his ground, he expects the advantages of his labours, and wishes the improvement he has made may give all its fertility to his crop: but nature sows while he is sowing; and her provision for keeping up the species of plants is very wonderful: their seeds are scattered to great distances, and where they fall they grow. While the seeds of some plants are winged with down to make them float upon the air, the roots of others are so full of life, that the least morsel remaining in the ground will grow.

In animals the loss of a limb or other essential part cannot be restored, except in some few particular kinds: but in plants, while any thing remains the whole will be renewed. Hence is the origin of weeds to be traced by the farmer, and hence he will find them universal. He is according to this distinct manner of their growth to divide them into two kinds; the perennial, or those which commonly rise from roots left in the ground; and the annual, which spring from seeds brought on by the winds.

A perennial plant is one whose root lives through winter, and shoots afresh in spring. The seeds of these may be brought by winds; but they are most pernicious when they rise from roots; the mischief lying deeper, and the plant being stronger.

The annual are such as rise only from seeds: these flower in summer, and die when they have perfected their seeds, which nature scatters for a succeeding crop. Perennial weeds ought to be got out in the tilling of the ground: the annual are to be cleared away afterwards by hoeing: for they are not in being when the tillage is performed.

Beside the effect of wind, these plants will rise from seeds buried in former tillage. The seeds of these will not grow unless they are near the surface; but many of them will continue  
good



# Annual Weeds



Melilot



Corn Marygold



Poppy



Charlock



Sow-thistle



Cockle



May Weed

# Perennial Weeds



Thistle



Couch Grass



Colt's-foot Flower



Colt's-foot Leaves



Rest-harrow



Wild Oat



Crow Garlic



Broadleaved Garlic



Fern



Spear Thistle







good when at a greater depth, and will grow when they are brought nearer the air by tillage.

It is impossible to guard against weeds, and the business is to destroy them. The better fences are kept up, the fewer seeds will be brought into the grounds; because the greater part are stopped by the leaves, and fall there. This is the reason why hedge bottoms are always full of weeds. The better tillage is used, the more the roots of perennial weeds will be taken out of the ground; but there will be still room for some encrease. Some seeds will come in, and some will be ripened upon the spot; so that notwithstanding the best care to prevent their growth, a great deal will also be required to destroy such as rise.

Weeds are to be expected in all places; and they will outgrow all crops. They are natives of the soil and climate; and will thrive better than such as are raised by art. It is a great advantage in the drill and horsehoeing husbandry that they can from time to time be destroyed as the crop is growing; and that every time they are cut up the ground receives a kind of tillage. In the common method they grow with the crop; and as they are naturally more vigorous, they draw the greater part of the nourishment from it.

## CHAP. II.

### *Of the several kinds of weeds.*

**E**VERY thing that grows among a crop without being sown or planted, is in that place a weed. Those weeds are most numerous which rise from seeds; and those most difficult to be extirpated which come from roots. *Sowthistles* and *groundsell* are an instance of the first kind, and *restharrow* of the latter; its root is so tough it will impede the progress of the instruments according to its name; and so full of vigour that the least morsel will grow.

Some have both these ill qualities of propagating abundantly by seed, and spreading also from their roots. *Colts foot* is an instance, its seeds are winged with down, and the root is as tough and full of life as that of *restharrow*; these are the most pernicious of all. *Couchgrass* propagates almost entirely by root; but it spreads so fast and so far, that nothing is more prejudicial.

From this review of the several natures of weeds, the farmer will know how he is to conduct himself. When he is about to enter upon the tillage of a piece of ground, let him consider what are the weeds upon it, and by that determine



his method of working: the horsehoeing husbandry is preferable in this respect, but most of all where the ground is over-run with perennial weeds.

The *common way thistle* is one of those of the worst kind, its roots creeping and spreading, while its seeds fly by means of the down.

*Fern* is another creeping rooted weed; and *melilot* is hateful not only by its abundant propagation, but its abominable flavour. These hurt the farmer two ways; they impoverish his crop, and give an ill condition to the grain. Wild garlick does the same damage. Where there are an abundance of thistles, and such other kinds, the ground will cost much more expence than under any other condition: the best practice is to tear it up with the four coultered plow, to harrow away the roots immediately after every plowing, and to work it up by the drill and horse-hoeing method. This will in a few years clear it of the worst weeds, and if he follow any other practice, they may remain torments to him throughout the longest lease.

The deep plowing and repeated harrowing will tear up and draw off a very great part of these roots; but as small fragments will grow, they would after this rise among the crop, and strengthen themselves in the ground during its growth: whereas in the horsehoeing method, the smallest fragments, as soon as they begin to grow, will be torn up and thrown out in the intervals, and very easily cleared from among the rows of the crop; and as these intervals of the present year are to be the places of rows of crop in the succeeding, the ground must in a few seasons be cleared from them.

### CHAP. III.

#### *Of clearing the ground of weeds.*

**W**EEDS utterly destroy some crops; and never fail to injure others in proportion to their number and nature. Hand-hoeing will, in some cases, answer the purpose with annual weeds, as the horse-hoeing does with the others; but even this, in the common random way of sowing, is scarce practicable.

We have told the farmer what he is to do in a land over-run with the perennial kind; and shall suppose him now about to undertake a piece that is tolerably free from these, but covered with the annual. The horse-hoeing method is preferable in this case also to any other, because it not only effectually destroys such as rise after the sowing, but makes them useful as a manure: but if the farmer is averse to this, let him take a  
middle



middle course. Where he sees this abundant growth of annual weeds, he may be sure there will be a proportional increase among his crop: they must be destroyed, or they will starve his corn. In the common way of sowing, nothing is so difficult as to get out weeds in the growth; but in this case it would be impracticable: therefore if he will not admit the hoe-plough into wide intervals, let him sow by the drill with somewhat narrower, that his crop may stand clear, and distinguished from the wild growth; and that the hoers may easily and conveniently clear the ground between the rows with hand-hoes.

This is an improvement of the common practice, and will be of great service; because the hoers, while they clear the intervals between the rows, may also draw up the weeds by hand that grow in the rows; but this is by no means comparable to the other method. The hand-hoers leave parts of the roots in the ground, and after the first shower there is a new crop of weeds; but the horse-hoe, tearing up the roots, admits of no such return.

These are the methods the husbandman will find most successful; but if he be so devoted to the old method, that no advantage can lead him out of it, his recourse must be to a summer's fallow. The more the ground is infested with weeds, the more care must be taken in the turning it up. A dry summer will destroy a vast number when they are from time to time torn up and exposed to the sun; but there are seeds that will lie a whole year without shooting, and on these the fallow takes no effect.

The wild oat is of this kind, and several others; for there are plants whose seeds naturally lie twelve or eighteen months in the earth. These escape the farmer's diligence in a summer fallow; they are not to shoot till the succeeding spring, and then they come up with vigour, as if the fallowing had been a preparation of the earth for them.

We represent these things as they are, and hope the proofs of advantage attending the practice of the new method, will induce him to follow it. The seeds that lie this length of time in the ground, are not the only source of a succeeding year's growth of weeds; a vast number are brought in with the dung and other common manures, and the great quantity rising from seeds, waisted in by winds, join in shewing that a method of husbandry which destroys them while the crop is growing, must more perfectly answer the purpose, than one by which they are only kill'd before the sowing.

Dung is composed chiefly of the stalks of corn; and, among these, there go into the litter the stalks of weeds and their



feeds; therefore while the farmer is enriching the land for his crop, he is sowing weeds to reap the benefit of it. These will rise in their full number, and they will thrive upon the newly-enriched soil abundantly. They can only be destroyed while the crop is growing, because they only grow with it.

The farmer in some cases attempts it, by weeding among his corn: but this is a method the worst calculated of all that ever were introduced into husbandry. The feet of the weeders must do harm, and it is often more than their hands do good. The corn standing irregularly, there is no avoiding trampling some of it down; and in other crops which more resemble weeds in their first shoot, there is the danger of tearing them up. This is the case with the annual weeds, and it is still worse with the perennial: they cannot be pulled up, because that would tear up some of the corn with them. All that can be done is the cutting off their heads; the nearer the root the better; but however near this is done, the remedy is only slight, temporary and imperfect; the root remains in all its vigour, and new shoots presently rise in the place of the old one. These are more numerous and draw more nourishment. Thus what appears a remedy, is an increase of the disease.

All this is obviated by the horse-hoeing husbandry: that destroys all weeds without any possible damage to the crop. This is plain to reason, and it is found true by experience; and with this last recommendation, added to the many we have occasionally named before, we close this part of our treatise.

#### End of the FOURTEENTH BOOK.

A Com-



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A

COMPLEAT BODY

OF

HUSBANDRY.

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BOOK XV.

*Of the poisonous and hurtful plants native of this kingdom.*

IN TWO SECTIONS.

SECT. I. POISONOUS.

CHAP.

1. *Of henbane.*
2. *Of hemlock.*
3. *Of deadly nightshade.*
4. *Of water dropwort.*

CHAP.

5. *Of dogs mercury.*
6. *Of herb christopher.*
7. *Of water-crowfoot.*
8. *Of yew.*

SECT. II. HURTFUL.

- |                                                    |                                                |
|----------------------------------------------------|------------------------------------------------|
| 9. <i>Of white rot, or cotyledon<br/>palustre.</i> | 11. <i>Of lousewort, or pedicu-<br/>laris.</i> |
| 10. <i>Of red rot, or ros solis.</i>               | 12. <i>Of spurge laurel.</i>                   |

THE INTRODUCTION.

**W**E have acquainted the farmer with what he ought to know, and what to do for the success of his business and improvement of his crops. We have occasionally, with what he is to undertake, shewn him what he is to avoid, and there requires but the single article we are here to treat of, to finish the design.

In



In treating of the disorders of cattle, we have mentioned their eating unwholesome plants; and these we are to consider more at large in this place. This kingdom does not afford many; but what there are the husbandman ought to know, for the security of his stock, and of the young among his family. Instinct gives creatures a general direction not to feed on hurtful things; but they sometimes neglect the caution; appetite in them, as well as in ourselves, getting the better of admonition. To us who have reason, this instinct is not given; and while too young to exert it, we are in the way of danger; nor are we at any time, without due information, altogether above the power of accidents of this nature. For this reason we shall here give the husbandman the full and distinct knowledge of what hurtful plants may fall in his way, adding to their descriptions the assistance of figures, that he may destroy them wherever he perceives them rise.

## B O O K XV. S E C T. I.

*Plants absolutely poisonous.*

**O**F these there are no more than eight wild in England: the farmer will, from the figures and descriptions, easily be acquainted with this small number: and we shall give him an account of their effects, not exaggerated by fancy or false histories, but from experience and authorities above the reach of question.

## C H A P. I.

*Of henbane.*

**H**ENBANE is a large spreading plant: it is capable of doing great mischief; and is not confined to woods or remote places, but grows naturally upon ditch banks, and is common almost every where. Nature which has thrown it in the way of mankind, yet has stamp'd so strong a mark of its qualities in every part, and given notices of its hurtful properties so evidently to all the senses, that she seems to have given a sufficient caution against any danger. It differs from all other plants in the form and hue of its leaves: its flowers are of a deadly dismal colour; and the whole plant is forbidding in its aspect. The eye marks it for a poison; and when offered to the other senses, they answer in the same language. Its taste is nauseous, but this cannot easily come into tryal; for its smell, which will be perceiv'd first, is most offensive.

By





*Deadly Nightshade*



*Hemlock*



*Henbane*



*Herb Christopher*



*Dog's Mercury*



*Water Dropwort*



*White Rot*



*The Yew Tree*



*Water Crowfoot*



*Spurge Laurel*



*Red Rattle*



*Common Sundew*







By this dismal look, and this forbidding smell, has nature warn'd men to beware of henbane, though they see it frequent about their dwellings: we shall prevent the possibility of mistaking it for any other plant, by adding the description of its several parts. The root is thick, long, and irregular. From this rise eight or ten leaves, very large, long, and of a greyish green colour. They are very deeply indented at the sides. The stalk grows up in the midst of these, and is whitish, hard, woody, full of branches, and two feet high. The upper branches spread out very much. Many leaves grow upon this, like those that first rise from the root. The flowers are numerous and large, but they are not conspicuous. They are hollow, like a bell, and are of a dead colour, vein'd in a very curious manner with purple. After these come short thick seed-vessels, which are full of small brown seeds.

Every part of this plant is poisonous, and it destroys people by throwing them into drowsiness, like a lethargy, with convulsions. Cattle will sometimes eat the young leaves, and this throws them into the sleepy evil, described before: if they have eat a great deal no medicines can recover them. Hogs will grub up the roots, and it affects them in the same manner. Chickens will pick out the seeds; and if they eat a large quantity, they die by it. This is the reason of its name *henbane*.

There have been instances of country fellows eating the roots by mistake; and they have died in the most miserable manner in convulsions.

The seeds of white henbane which are used in medicine, are those of a different plant, called white henbane. This is altogether poisonous.

## CHAP. II.

### *Of hemlock.*

**T**HIS is another poisonous plant which nature, for reasons to us unknown, has made to grow in great abundance near our habitations. It is a gloomy-looking plant, and by no means inviting to the eye. Its smell also is heavy, and seems to the most ignorant person unwholesome.

There is a sort of hemlock which grows of itself in gardens, and resembles parsley; but this, though a very unwholesome plant, is not the poisonous kind. That is the large kind which grows wild in hedges; and it is distinguished by its height, its aspect, and its painted stalk. The root is white, thick, long, and of an unpleasant smell. The leaves that grow from this are very large, two foot broad, but divided into innumerable small parts, in a regular and beautiful manner; and they are of  
a dull



a dull and blackish green. The stalk grows up in the midst of these, and it is two yards high, and as thick as a child's arm. It is of a dingy green, but painted in a beautiful manner with purple, so that it resembles the speckled skin of a snake. The flowers are white, they are small, but they stand in large clusters at the tops of the branches. The seeds are roundish, of a pale green colour, and striated. Two come after every flower.

There are several other kinds of this; especially a very singular one with a thick stalk, that grows in waters. They are all of a poisonous quality; but this common hedge kind worst of all. The stalks are the most poisonous part; and next to them the seeds. Some pretend the root has scarce any bad qualities; but this is not confirmed upon sufficient experience.

The Athenians extracted the juice of hemlock from the lower parts of the stalks before the plant rose up to flower; and with this poison they executed criminals instead of hanging. Socrates died by it.

Many of those diseases of cattle which perplex the farmer and the farrier, and at length end in the creature's death, are the effect of eating the young shoots of this plant. Some birds feed upon the seeds without hurt; but they are fatal to other creatures.

### CHAP. III.

#### *Of deadly nightshade.*

**T**HIS is a plant not so common as the others; but that wherever it is seen should be rooted up, for it is fatal to children. Nature, which has not planted this in the way of mischief so much as the other two, has not been careful to mark it as those for a thing to be dreaded. On the contrary, it is a beautiful plant, yet with a somewhat melancholy aspect. The root is long and thick, and it creeps under the surface of the ground. From this rise many large and broad leaves of a deep green colour, and not at all notch'd at the edges. The stalk is round and thick, divided into many branches, and a yard high. It is full of leaves like those from the root, and toward the top has many flowers. These are large, hollow like a bell, and of a dusky purple.

After these come berries which are large, and of a very tempting aspect; they are of a shining and jetty black, and are as big as cherries. They are ripe in July and August. Children are tempted to eat these, and they are always fatal. A single berry will bring on convulsions; but they seldom stop with one or two. They commonly die miserably a few hours after eating them.

I re-



I remember an instance of two children in Northamptonshire, who eat immoderately of them, and did not live to get home. They were track'd from the plant to the place where they fell by bloody stools, and there died in convulsions.

## C H A P. IV.

*Of water dropwort.*

**T**HIS is a plant, which, like the former, has been fatal to many persons, who have been tempted by the look to eat of it. The root possesses the greatest degree of poison. It always grows by waters, and is very common in most parts of the kingdom. The root is composed of several long and large pieces which resemble parsnips in shape and colour. The leaves from these are large, and of a pale green, and they are divided into a great number of segments. The stalks rise several together, and are upright, divided into many branches, and a yard high. They have several leaves upon them like those from the root, and of the same faint colour.

The flowers are small and yellowish; they grow in great tufts at the tops of the stalks, and after every one of them there come two small seeds. The roots, when fresh taken up, have an inviting aspect: they run out a white juice like milk when cut; and this presently after turns yellow. Many have eat of them, and all died. We have instances of the sad effects from very early time; and within these few years the same fatal scene has been repeated. They take the same effect whether raw or boiled; and those who eat them die raving.

## C H A P. V.

*Of dog's mercury.*

**T**HIS is another of those plants which tempt the ignorant by their pleasing aspect, and are in their effects fatal. The whole herb appears very inviting; it is fresh and green at a time when every thing else is dead; and many have eat it raw or boiled, and perished by it.

It is common under hedges, and has a very alluring look. The root is slender and long; it divides into many branches, and spreads under the surface of the ground. The stalks are round, upright, not at all branched, of a faint green, and about a foot high. They are almost naked toward the bottom, but nearer the top there stand many leaves; these are long and notched at the edges; and they are of a bright pleasant green. The flowers are inconsiderable. On some parts there stand spikes



spikes of a greenish colour, and on others seeds, which are as it were double.

The plant is in full vigour early in spring, and its fresh look has tempted many to boil it for food. Whole families have been poisoned by it. The children have generally died: sometimes the father and mother have recovered; but in other instances all have perished together. They die in convulsions, and in the greatest agonies.

## CHAP. VI.

### *Of herb christopher.*

**T**HIS is a plant as fatal in its effects as any; but happily it is found in few parts of this kingdom, and there generally in woods, far remote from dwellings. The root is long, thick and whitish.

From this rise large leaves, supported on long, red footstalks. Each leaf is divided into many small parts, and it is of a deep green colour. The stalk rises in the midst, and is round, upright, reddish, and two feet high. Several leaves grow upon this, which in all respects resemble those from the root, and are when bruised of an unpleasing smell.

The flowers stand in long clusters upon small stalks growing at the top of the plant, and from the bosoms of the leaves; they are small and white. The berries that follow these hang in the manner of bunches of currants, and they are of a shining black colour. They are ripe in autumn. Children who have gone out to gather black-berries have been tempted to eat these, and have in consequence died in convulsions. The plant has been from this named bane-berries. The young shoots also poison cattle.

## CHAP. VII.

### *Of water crowfoot.*

**E**VERY one knows the common crowfoot of the meadows, which children call butter cups: that is of a burning quality; but there is one kind of it which has been sometimes eaten, and has never failed to prove a desperate poison, destroying people in a particular and very frightful manner. This is common in watery places, and is perfectly different from all the others, and indeed from all other plants. The root is composed of white threads. The leaves rise from this, a great many together, and are broad, of a roundish shape, irregularly divided about the edges into three or more parts: they are smooth, of a shining surface, and of a pale yellowish green.

The



The stalk rises up in the midst of these, and is very thick, fleshy, of a pale green, two foot high, and divided into a great many branches.

Several leaves grow upon this like those from the root, and are of a pale green. The flowers stand at the tops of the branches: they are very small and yellow; and resemble the common crowfoot flowers in shape, but they are paler coloured. The seeds are small and green; they stand together in a kind of oval heads, and easily fall off when touched.

The plant is common about the edges of ponds; and where water has stood in winter. Its leaves are up early in spring, and by their freshness tempt cattle and sometimes men to eat them. They are the causes of many of those disorders which affect cows and oxen in the early season. Their effect on mankind is terrible: death is a certain consequence; and they die laughing.

#### CHAP. VIII.

##### *Of yew.*

**T**HE trunk of the yew is covered with a reddish bark. Its branches spread irregularly, and its leaves are composed of many small narrow ones, which stand regularly on the two sides of a stalk in rows, and are of a blackish green. The fruit is composed of a green button placed in a red juicy cup, resembling the husk of an acorn. The tree is wild in our woods in some places, and is planted also for ornament; being an ever-green. Children eat the juicy part of the fruit, which is not poisonous.

The farmer's care must be to keep his cattle from the leaves. They will frequently eat the clippings thrown out of gardens, or the young shoots when it is planted where they can get at it. When they eat but little of it, they fall into disorders which often end in their death: but, when they swallow it in a larger quantity, they die presently.

### BOOK XV. SECT. II.

*Such as are not absolutely poisonous, but very hurtful.*

#### CHAP. IX.

##### *Of white rot.*

**T**HIS is a little obscure plant, which often grows in abundance where it is little minded, and is the cause of terrible mischief to the farmer. It consists of a parcel of stalks which lie upon the ground; and spread themselves in a very  
irregular



irregular manner. They are as small as a packthread, and of a pale whitish green. Sometimes they rise a little upwards, but rarely.

These stalks send down little tufts of fibrous roots in various places; and where these shoot from the lower part, there rise from the upper side, leaves. These are as large as a half crown-piece, and of a round shape, but indented irregularly at the edges. The stalk which supports them, is long and slender; and it is inserted not at the edges, as in most other plants, but in the middle. The colour of the whole leaf is whitish, and it is of a thin substance. The flowers are very small and inconsiderable: they are of a pale colour, and they stand on slender foot-stalks rising from the bosoms of these leaves. The seeds are small and brown.

This is the whole of a plant, whose low condition renders it unsuspected by the farmer, while it is the ruin of his flock. It is common in marshy grounds, where it runs close to the bottom, and is hid among the grass. The sheep eat of it abundantly among the grass, being pleased with its sharp taste. The consequence is, their falling into that terrible distemper the rot: from which few that have eaten any large quantity of this herb, escape.

## C H A P. X.

### *Of sun-dew.*

**T**HIS is another plant fatal to sheep; and which, in the same manner, is often overlooked by those who know its bad effects, by reason of its smallness. It is six inches high, and is all over of a red colour; and, upon a closer examination, it surprises yet more, by being covered with large drops of water in the most violent heats: it hence obtained the English name sun-dew; and it is also called frequently ros, or rosa folis. The root is composed of a few small fibres. The leaves rise in a little tuft eight or ten together. Each is supported on a long slender foot-stalk. They are of the bigness of a silver penny, round, of a red colour, but covered with very long and stiff yellow hairs: upon these rest the great drops of water. The stalk rises in the midst of these, and is upright, slender, and has no leaves upon it. It generally divides into two parts at the top. The flowers grow in rows at the top: they are small and white; and they seldom open perfectly. The seed-vessel is short, and the seeds are very small. This plant grows on boggy grounds; and has a sharp taste, for which the sheep like it. They eat it too frequently, and its effects



effects are the same as those of the former. It brings on the rot; and those which have eat much are incurable.

C H A P. XI.

*Of lousewort.*

**T**HIS is another inhabitant of marshy grounds, which is hurtful to sheep, though not so fatal as the others. It is a larger plant than either of those, and easier seen; but it is as often overlooked or disregarded. The root is composed of a vast number of fibres, which run deep in the ground. The leaves rise in little tufts and are small, and beautifully divided. They are of a fleshy substance, and of a faint green; but very often they are brown, and sometimes reddish. The stalks are weak, and do not stand upright: they are six or eight inches long, and of a reddish colour. They have many leaves resembling those which grow from the root; and at their tops stand the flowers. These are gaping, and of a strong red; and they stand in reddish and streaked husks.

All our wet meadows abound with this plant. Its juicy substance and taste allure the sheep to eat of it; and it throws them into many disorders. There is no herb that has so speedy, evident, and certain an effect in fouling the blood. The most healthy and clean flock, will, in a fortnight, grow scabby and scurfy upon the skin; their wool will be loose, and they will be over-run with vermin.

We have before delivered the method of curing this disorder; and the farmer must be careful to observe the direction of removing the sheep to a dry upland pasture. Those are places where the plant cannot grow; and there is no security but that of the creature's not feeding upon it, while under cure.

C H A P. XII.

*Of spurge-laurel.*

**T**HIS is a shrubby plant of a very pleasing aspect, and worthy to be introduced into gardens; but it is one that the farmer should extirpate from his fields when he happens to have it. The singular appearance renders it easily known, and it is only found on hilly grounds. The root is composed of long and tough fibres. The stem is as thick as a man's thumb; and it is covered with a brown bark. Toward the bottom it is naked; but there are numerous leaves about the upper part. The whole shrub is three foot high; and the leaves grow principally at the ends of the branches. They are long, broad, and



and of a firm substance : their colour is a deep green ; and they in some measure resemble the leaves of the common laurel.

The flowers grow in clusters below the leaves, and they are small and green. After them come berries, which when ripe are black : they are of a longish shape, and have a single large kernel. It is frequent on waste ground in hilly places in many parts of England, and flowers early in spring. Cattle are tempted by the freshness of the leaves to taste them ; and they are so sharp that they inflame their mouths. Some will eat them in small quantities, and the effect is terrible ; they bring on the most violent purgings with bloody stools ; and often these complaints resist the power of all remedies, and terminate in the creature's death.

I had in the year 1740 an instance of this in three cows, which had been seen eating the tops of this shrub in April. They all fell into these purgings, and though every method was used that could be thought of, all three died.

We have elsewhere in its place informed the husbandman in what manner he is to undertake the cure of these disorders ; but it is much better to prevent them by rooting out such hurtful plants, as are their worst cause.

### End of the THIRD VOLUME.











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11.97







Hale, Thomas

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In Cultivating, Planting and Stocking of Land ...  
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